TM 5-1300

MAINTENANCE MANUAL AND SPARE PARTS CATALOG

MODEL CTD REVOLVING CRANE

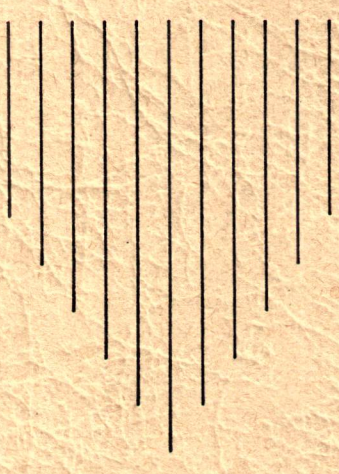
FOR

INTERNATIONAL HARVESTER COMPANY

MODEL TD-18 TracTracTor

CONTRACT NO. W-11-032-ENG (MSP)-187

IDENTIFIED BY TECHNICAL ORDER NO. 19-40-13
EFFECTIVE WITH
MACHINE SERIAL NO.
CTD-1



THE HUGHES-KEENAN COMPANY

Successors to the Crane Division,
Cardwell Mfg. Co. Inc., Wichita, Kansas

MANSFIELD, OHIO, U.S.A.

MAINTENANCE MANUAL
AND
SPARE PARTS CATALOG

MODEL CTD REVOLVING CRANE

Prepared for Mounting on

INTERNATIONAL HARVESTER COMPANY

Model TD-18 TracTracTor

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THE HUGHES-KEENAN COMPANY

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MANSFIELD, OHIO, U.S.A.

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Identified by Technical
Order No. 19-40-13

4 — 1 — 45

Printed in U. S. A.

OPERATIONS SECTION

– For –

MODEL CTD REVOLVING CRANE

Prepared for Mounting on

INTERNATIONAL HARVESTER COMPANY

Model TD-18 TracTracTor

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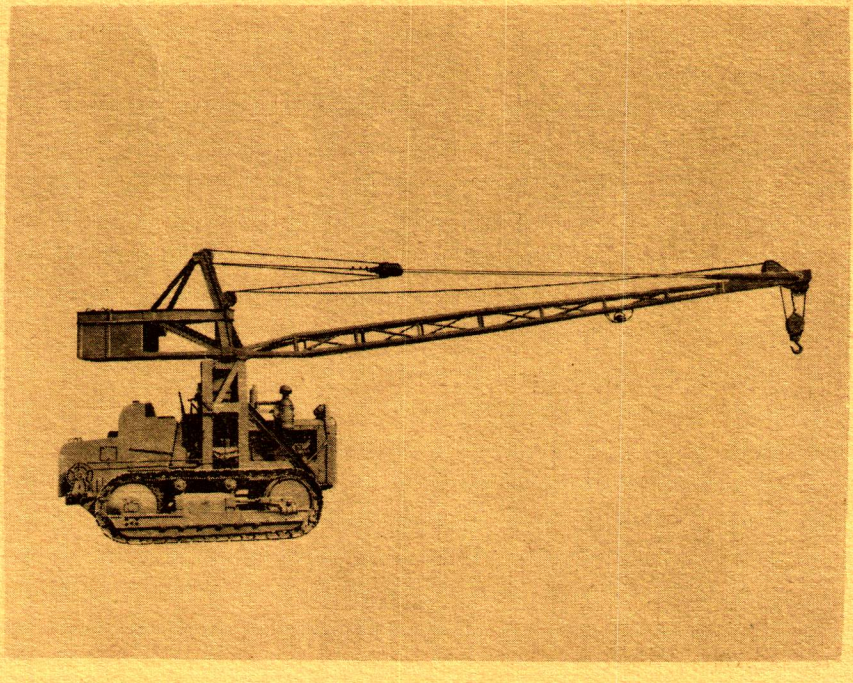


Figure 1 Model CTD Revolving Crane Mounted on International Harvester Company Model TD-18 TracTracTor

SPECIFICATIONS

Specifications For Model CTD Revolving Crane Mounted On International Harvester Company Model TD-18 TracTracTor.

TRACTOR must be prepared for mounting the revolving crane. The special arrangement of the tractor is described by International Harvester Company, Specification IHC-G-179 Government Machine.

BOOM is mounted on a vertical fabricated steel tube at the center of the tractor. This tube is supported by bronze bearings, and is rotated in either direction by power through a worm drive. The maximum swing of the boom is 180 degrees each way from front center at the rate of 2.3 RPM. The swing of the boom is controlled by friction clutches with a single lever, and is held in any position by an automatic brake when the lever is in neutral. The boom is an electrically welded structure of angle sections and pipe cross bracing. Worm and gear drive operates in oil bath in a completely oil-tight case.

LIFTING CAPACITY

30 Foot Boom				
Radius Ft.....	12	18	24	30
Lifting Capacity: Without Counterweights	9,800	5,900	4,200	3,260
With Counterweights	13,900	8,300	6,000	4,660

BOOM AND LOAD HOISTS are chain and worm driven, and are operated independently in either direction by friction clutches with a single lever. Boom operations or hoisting either up or down, and swinging of the boom in either direction can be done simultaneously with each other. The worm shafts are mounted on Timken roller bearings, and are equipped with automatic brakes which will hold the full load of the hoists. Jaw clutches provided on the worm shafts are operated by foot pedals.

The worms are made of alloy steel, heat-treated and ground. Worm gears are made of phosphor-bronze with machined teeth. Worms and gears operate in oil bath in completely oil-tight cases. Chain and belt drives to the hoists are protected by shields.

SPECIFICATIONS

(Continued)

The drums are cast of alloy iron. The drum tubes are 10″ in diameter. Drum shafts are heat-treated alloy steel, ground and polished. The average line speed at full governed speed of the engine is 156 feet per minute.

CABLES

The load line is three part and equipped with ball bearing swivel hook on a single sheave block. The boom line is five part construction from the top sheave frame to the boom block. A double line from the boom block to the end of the boom is ¾″ diameter. Boom and load lines are ½″ diameter 6x37 wire improved plow steel. Boom can be raised from horizontal to highest working angle in 12 seconds.

FRAME is electrically welded of boxed angle sections. It is bolted to the tractor at the mounting pads which are provided on the tractor track roller frame, mainframe and non-oscillating bar. It is reinforced at critical sections and is braced to prevent twisting in the body of the tractor due to boom loads.

WEIGHT without tractor, including counterweights, is approximately 14,500 pounds: with tractor 41,630 pounds.

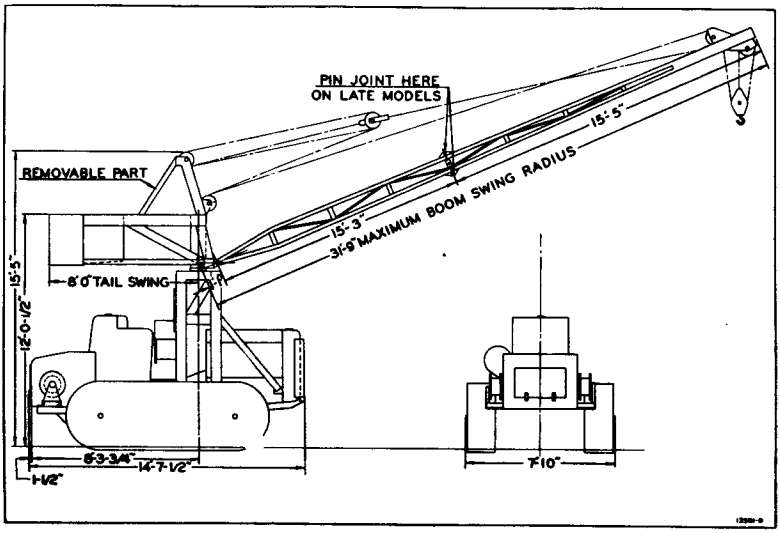


Figure 2 Overall Dimensions of Crane Mounted on Tractor

PACKING LIST

PREPARING CRANE FOR SHIPMENT:

The Model CTD Revolving Crane assembly is a tractor attachment and is usually shipped from the factory in a disassembled form. Semi-assembled portions of the entire assembly shall be known as items.

IDENTIFICATION OF ITEMS:

Items are identified by an attached metal tag having a number stamped on each tag. The numbers start with 1 and run consecutively as needed to cover parts for one crane.

Illustrations appear on the packing list which present the general appearance of each item. All part numbers or group numbers describing the contents of each item are listed opposite the illustration.

Each illustration of an item includes a scale which conveys to the reader the proportional size of the item.

IDENTIFICATION OF INDIVIDUAL PARTS:

All major assemblies of the crane have been assigned group numbers. Under the "Group Index" column of the packing list appears a combination of two numbers. These numbers serve as an index to the Parts Catalog Section.

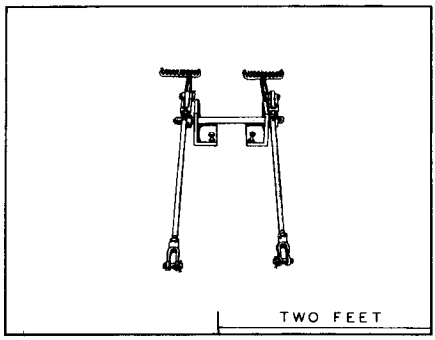
Each page of the Parts Catalog Section has a group number printed in the upper right hand corner. If a more detailed observation of parts, or the number of any part is desired, the part may be found in the Spare Parts Catalog Section within the group designated on the packing list.

GENERAL INSTRUCTIONS

All standard hardware required for the attachment of any item is included with the group of parts which makes up the item. Any small part or portion which might be damaged during shipment is placed in a separate container and attached to the main portion of the item.

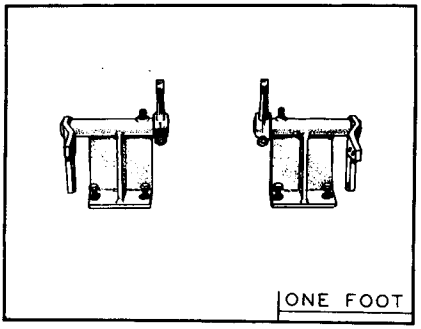
All reference to right, left, front or rear is considered as a position from the operator's seat.

PACKING LIST



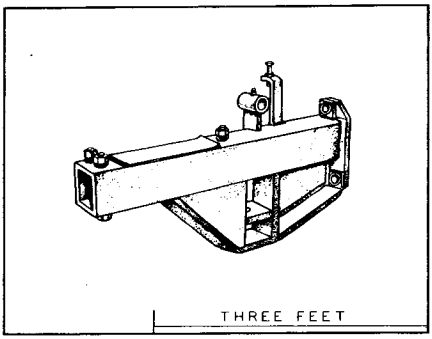
ITEM 1 Hoist Control Pedals

Group Index	Part No.	Description	Quan. Req'd
1-1	178-161	Pedal	1
	178-159	Pedal	1
	129-547	Link	2
	5-2671	Clevis	4
	KL-367	Pin	4
	½"-20 NF	Jam Nut	4
	⅛"x⅞"	Cotter Pin	4
	178-195	Bracket	1
	178-197	Bracket	1
	⅜"-16x1¼" NC	Capscrew	4
	⅜"	Lockwasher	4
	5/16"	Washer—Plain	4
	178-162	Shaft	1
	¾"	Bushing—Machinery	2
	⅛"x1"	Cotter Pin	2
	1-443	Fitting—Grease	2



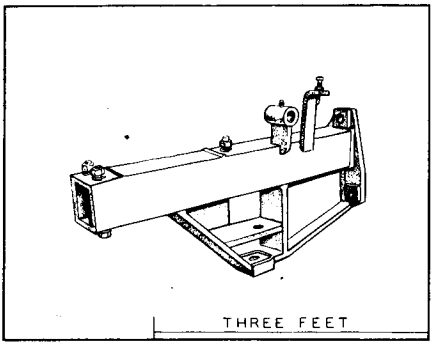
ITEM 2 Hoist Control Brackets

Group Index	Part No.	Description	Quan. Req'd
1-1	178-147	Lever & Shaft	1
	178-157	Bracket	1
	1-443	Fitting—Grease	2
	178-153	Lever	2
	½"-20x2½" NF	Capscrew	2
	½"-20 NF	Nut	2
	½"	Lockwasher	2
	178-145	Bracket	1
	½"-13x1½" NC	Capscrews	4
	½"	Lockwasher	4
	178-151	Lever & Shaft	1



ITEM 3 Rear Support - Right

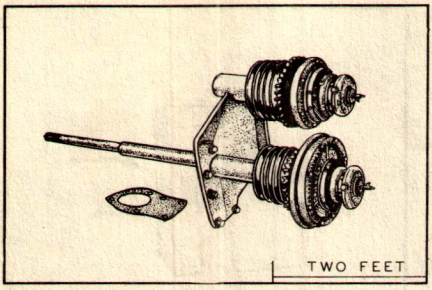
Group Index	Part No.	Description	Quan. Req'd
12-4	178-1284	Support—Right	1
	1-443	Fitting—Grease	1
	5-1121	Bolt—Adj.	1
	½"-13 NC	Jam Nut	1
	¾"-16x6" NF	Capscrew	2
	¾"-16 NF	Nut	3
	¾"	Lockwasher	3



ITEM 4 Rear Support - Left

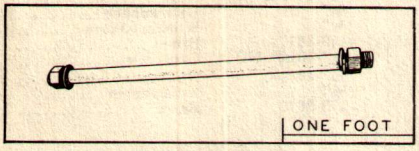
Group Index	Part No.	Description	Quan. Req'd
12-4	178-1285	Support—Left	1
	1-443	Fitting—Grease	1
	5-1121	Bolt—Adj.	1
	½"-13 NC	Jam Nut	1
	¾"-16x6" NF	Capscrew	2
	¾"-16 NF	Nut	3
	¾"	Lockwasher	3

PACKING LIST



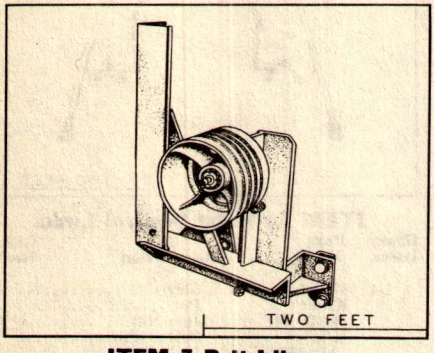
ITEM 5 Power Takeoff

Group Index	Part No.	Description	Quan. Req'd
2-1	.....	P.T.O. Belt Drive.....	1
		Note: Omit Drive Belts. Wrap gasket in waterproof paper.	
2-2	.....	Hoist Direct Drive....	1
		Note: Omit Drive Chain.	
2-3	.....	Hoist D. Drive Clutch	1
2-4	.....	Hoist Reverse Drive..	1
2-5	.....	Hoist Reverse Drive Clutch	1



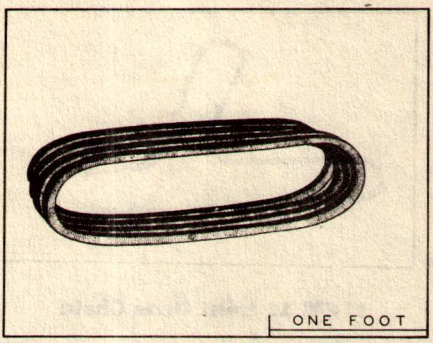
ITEM 6 Stud

Group Index	Part No.	Description	Quan. Req'd
12-4	178-117	Stud	1
	1-733	Nut	2
	1-778	Lockwasher	2



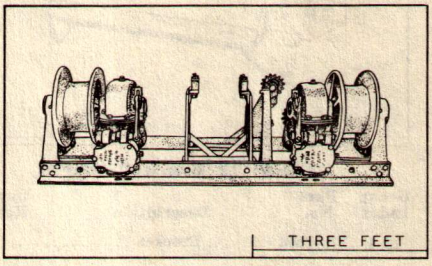
ITEM 7 Belt Idler

Group Index	Part No.	Description	Quan. Req'd
3-4	151A-1002	C.S. Drive Belt Idler..	1
12-4	178-4730	Support	1
	1-7003	Capscrew	1
	1-775	Lockwasher	1
	¾"-10x2¼" NC	Capscrew	2
	¾"	Lockwashers	2
	178-1243	Shim	2



ITEM 8 Power Takeoff Belts

Group Index	Part No.	Description	Quan. Req'd
2-1	1-6637	Belt	4



ITEM 9 Dual Hoist

Group Index	Part No.	Description	Quan. Req'd
1-2	178A-1001	Hoist—Dual Ass'm....	1
	166-1641	Bracket—Left	1
	121-989	Spring	2
	35-971	Eye Bolt.....	2
	½"-13 NC	Jam Nut.....	4
	178-3625	"U" Bolt	2
	7/16"-14 NC	Nut	4
	7/16"	Lockwasher	4
	⅜"	Washer—Plain	4
	166-1642	Bracket—Right	1
1-6	151A-1001	Idler Ass'm.....	1
2-6	178-2555	Bracket	1
	⅝"-18x1¾" NF	Capscrew	4
	⅝"-18 NF	Nut	4
	⅝"	Lockwasher	4
	1-443	Fitting—Grease	2
	84-4364	Bearing	2
	¾"-16x4¼" NF	Capscrew	2
	¾"-16 NF	Nut	2
	¾"	Lockwasher	2
	97-4362	Shim	4

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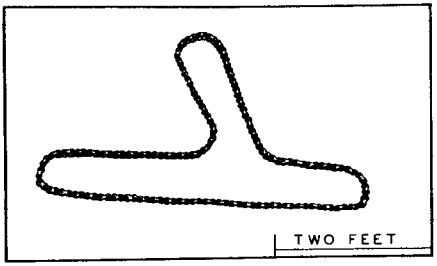
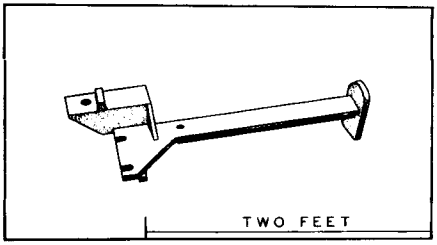
PACKING LIST



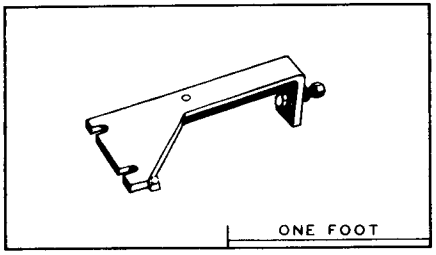
ITEM 10 Hoist Drive Chain

Group Index	Part No.	Description	Quan. Req'd
2-2	178-1431	Chain—Drive	1



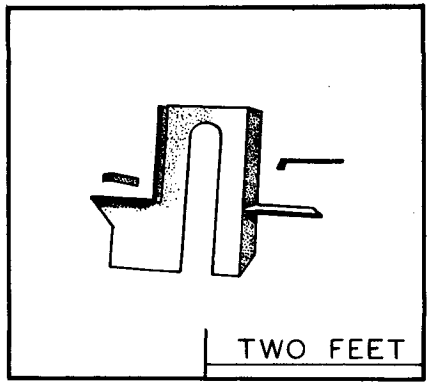
ITEM 11 Bracket - Right

Group Index	Part No.	Description	Quan. Req'd
12-4	178-1266	Bracket	1



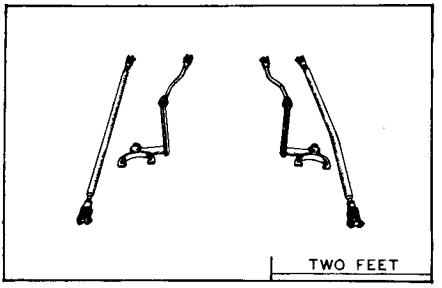
ITEM 12 Bracket - Left

Group Index	Part No.	Description	Quan. Req'd
12-4	178-1267	Bracket	1
	½"-13x1¾" NC	Capscrew	1
	½"-13 NC	Nut	1
	½"	Lockwasher	1



ITEM 13 Power Takeoff Shield

Group Index	Part No.	Description	Quan. Req'd
16-1	178-1606	Shield	1
	⅜"-16x1" NC	Capscrew	1
	⅜"-16x1¼" NC	Capscrew	3
	⅜"-16 NC	Nut	4
	⅜"	Lockwasher	4
	⅜"	Washer—Plain	1
	178-3677	Brace	1
	½"-13x2" NC	Capscrew	1
	½"-13 NC	Nut	1
	½"	Lockwasher	1
	178-3678	Brace	1



ITEM 14 Hoist Control Links

Group Index	Part No.	Description	Quan. Req'd
1-1	5-2671	Clevis	6
	KL-367	Pin	8
	½"-20 NF	Jam Nut	6
	⅛"x⅞"	Cotter Pin	8
	104-1458	Link	1
	178-155	Link	1
	178-152	Link	1
	178-154	Link	1
	1-5689	Fork—Shifter	2
	1-5690	Key	2
	⅜"-24x2¼" NF	Capscrew	2
	⅜"-24 NF	Nut	2
	⅜"	Lockwasher	2
	152-161	Lever	2

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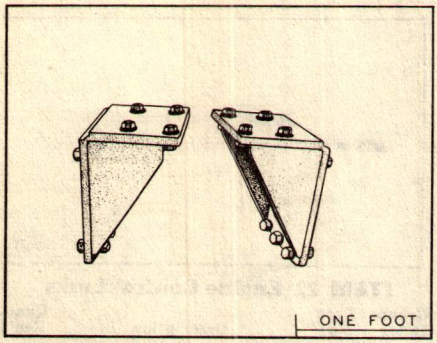
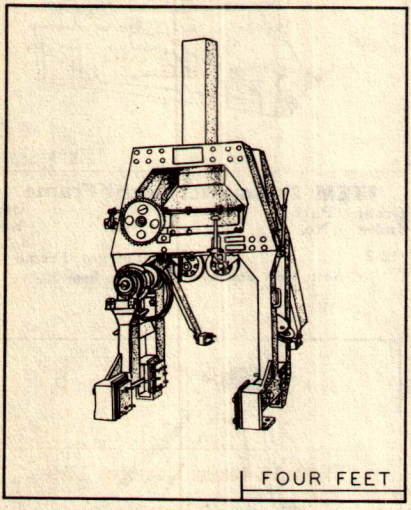


ITEM 15 Main Frame Supports

Group Index	Part No.	Description	Quan. Req'd
12-1	178-1202	Support	2
	⅞"-14x2¾" NF	Capscrew	8
	⅞"-14 NF	Nut	8
	⅞"	Lockwasher	20
	⅞"	Washer—Plain	16
	⅞"-9x2" NC	Capscrew	12

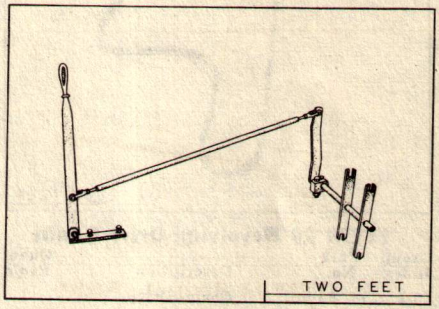


ITEM 16 Main Frame

Group Index	Part No.	Description	Quan. Req'd
3-1	1-5992	Belt	4
3-3	.....	Revolving Drive Control	1
	Note: Omit Control Lever and Link—See Item 21.		
5-1	.....	Reverse Countershaft.	1
5-2	RL-1755	Bolt—Adjustment	1
	½"-13 NC	Jam Nut	2
	½"-20x7½" NF	Capscrew	2

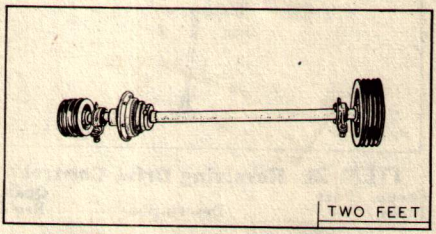
ITEM 16 Main Frame
(Continued)

Group Index	Part No.	Description	Quan. Req'd
	½"-20 NF	Jam Nut	2
	½"-20 NF	Nut	2
	½"	Washer—Plain	2
8-1	.....	Mast Column	1
8-2	.....	Lower Mast Housing	1
8-3 & 8-4	.....	Mast Worm Shaft	1
9-1	.....	Engine Controls	1
	Note: Omit Compression Release and Throttle Links—See Item 22.		
12-1	.....	Frame	1
	Note: Omit Main Frame Supports—See Item 15.		
–	*Shims to be wired to main frame in their respective positions.*		
16-5	SW-256A	Name Plate	1
	152-3602	Instruction Plate	1
	178-4637	Instruction Plate	1
	178-1620	Instruction Plate	1
	178-1659	Instruction Plate	1
	178-1674	Instruction Plate	1
	3/32"x¼"	Drive Screw	32



ITEM 17 P. T. O. Clutch Control

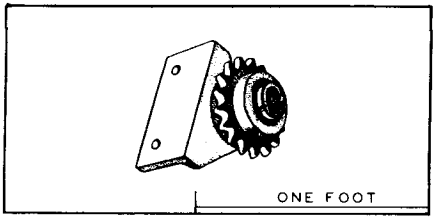
Group Index	Part No.	Description	Quan. Req'd
2-6	.....	P.T.O. Clutch Control	1
	Note: Omit Shifter Support and Two Bearings—See Item 9.		



ITEM 18 Primary Countershaft

Group Index	Part No.	Description	Quan. Req'd
3-1	.....	Primary Countershaft	1
	Note: Omit Drive Belts and Chain—See Items 16 and 20.		

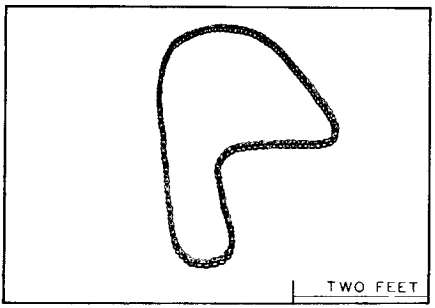
PACKING LIST



ITEM 19 Revolving Drive Chain Idler

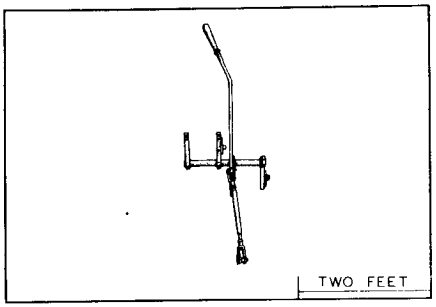
Group Index	Part No.	Description	Quan. Req'd
5-2	151A-1005	Revolving Drive Chain Idler.....	1

Note: Omit Adj. Bolt and Capscrews—See Item 16.



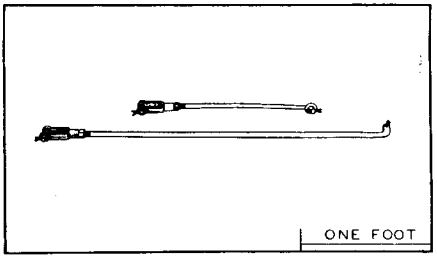
ITEM 20 Revolving Drive Chain

Group Index	Part No.	Description	Quan. Req'd
3-1	178-362	Chain—Drive	1



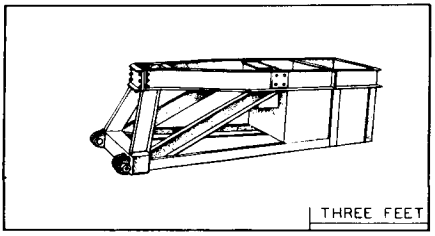
ITEM 21 Revolving Drive Control

Group Index	Part No.	Description	Quan. Req'd
3-3	152-340	Lever	1
	152-368	Bracket	2
	½"-13x1" NC	Capscrew	2
	½"	Lockwasher	2
	½"	Washer—Plain	2
	178-342	Link	1
	5-2671	Clevis	2
	½"-20 NF	Jam Nut.....	2
	KL-367	Pin	2
	⅛"x⅞"	Cotter Pin.....	2



ITEM 22 Engine Control Links

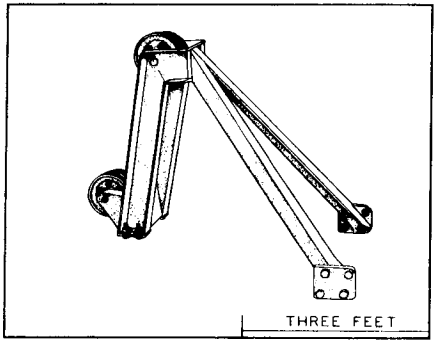
Group Index	Part No	Description	Quan. Req'd
9-1	178-931	Link—Comp. Release..	1
	178-919	Link—Speed Control..	1
	5-2671	Clevis	2
	KL-367	Pin	2
	½"-20 NF	Jam Nut.....	2
	⅛"x⅞"	Cotter Pin.....	4
	½"	Machinery Bushing...	2



ITEM 23 Counterweight Frame

Group Index	Part No.	Description	Quan. Req'd
12-2	.....	Counterweight Frame	1

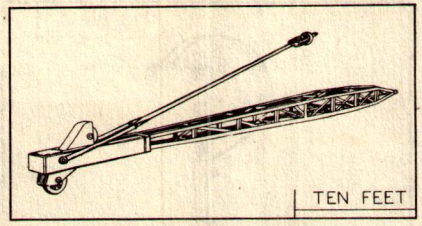
Note: Omit Counterweights—See Item 36.



ITEM 24 Sheave Frame

Group Index	Part No.	Description	Quan. Req'd
12-3	.....	Sheave Frame.....	1

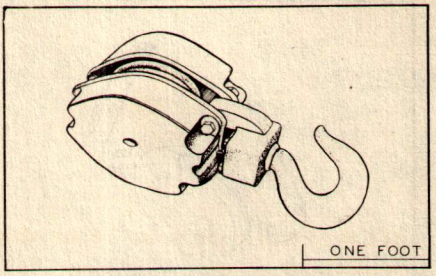
PACKING LIST



ITEM 25 Boom Column

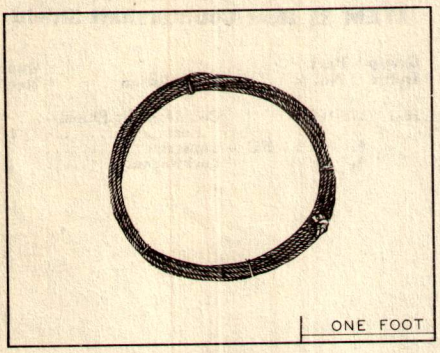
Group Index	Part No.	Description	Quan. Req'd
6-1	.....	Boom Column.....	1

Note: Omit Boom Line and Load Lines—See Items 26 and 27.



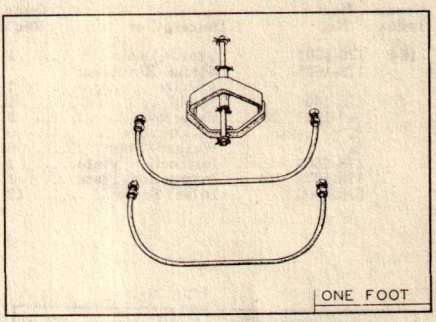
ITEM 28 Swivel Hook Block

Group Index	Part No.	Description	Quan. Req'd
6-3	178A-6001	Swivel Hook Block....	1



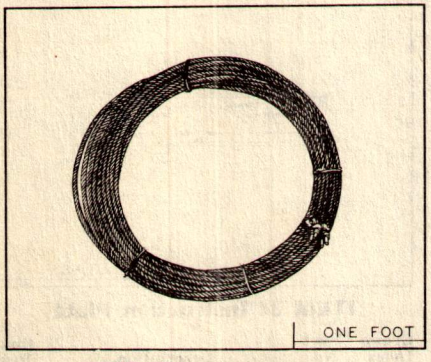
ITEM 26 Boom Cable

Group Index	Part No.	Description	Quan. Req'd
6-1	152-644	Boom Cable.....	1
	1-158	Clamp	3



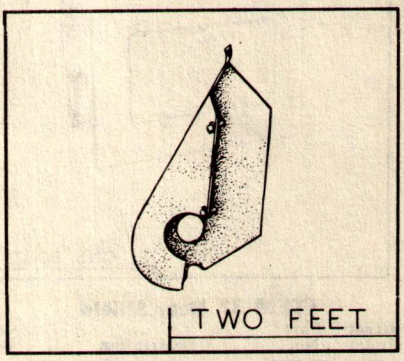
ITEM 29 Boom Light Brackets

Group Index	Part No.	Description	Quan. Req'd
15-1	.....	Boom Light Brackets	1



ITEM 27 Load Cable

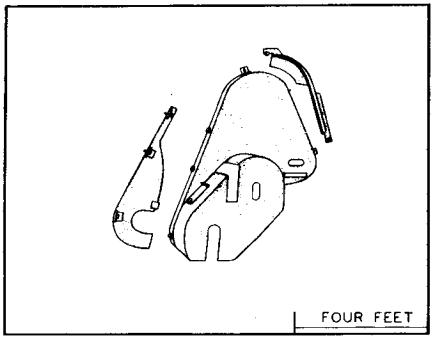
Group Index	Part No.	Description	Quan. Req'd
6-1	152-645	Load Cable.....	1
	1-158	Clamp	3



ITEM 30 Front Countershaft Shield

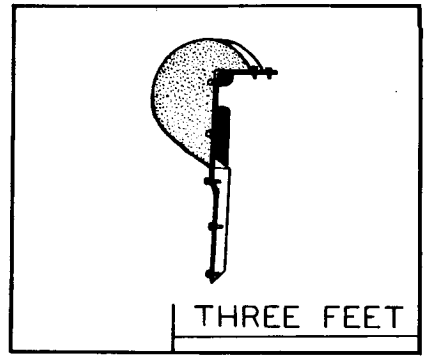
Group Index	Part No.	Description	Quan. Req'd
16-2	178-1604	C'shaft Shield—Front.	1
	⅜"-16x¾" NC	Capscrew	3
	⅜"	Lockwasher	3
	⅜"	Washer—Plain	3

PACKING LIST



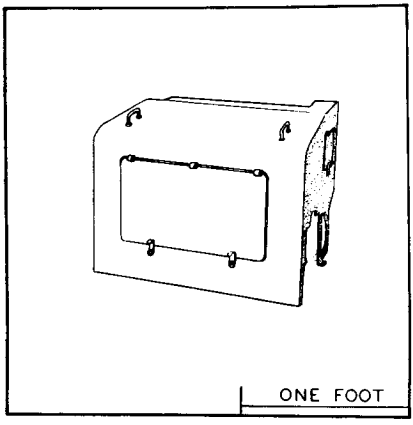
ITEM 31 Revolving Drive Shields

Group Index	Part No.	Description	Quan. Req'd
16-2	178-1601	Guard—Chain	1
	178-1605	Shield—Revolving Drive	1
	178-1607	Shield	1
	⅜"-16x1" NC	Capscrew	6
	⅜"	Lockwasher	6
	⅜"	Washer—Plain	6
	178-1658	Instruction Plate	1
	178-1679	Instruction Plate	1
	3/32"x¼"	Drive Screw	12



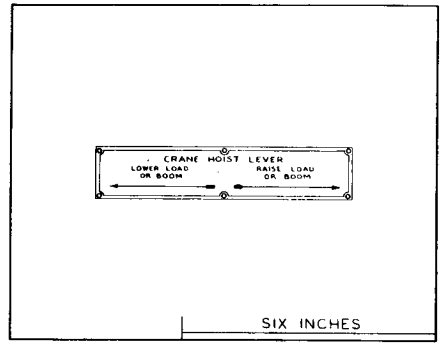
ITEM 33 Rear Countershaft Shield

Group Index	Part No.	Description	Quan. Req'd
16-1	178-1609	Countershaft Shield—Rear	1
	⅜"-16x¾" NC	Capscrew	7
	⅜"	Lockwasher	7



ITEM 32 Rear Shield

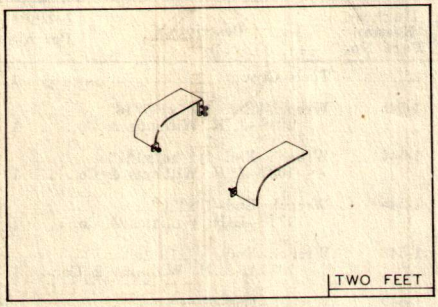
Group Index	Part No.	Description	Quan. Req'd
16-1	178-1603	Rear Shield	1
	⅜"-16x1¼" NC	Capscrew	2
	⅜"-16x1½" NC	Capscrew	3
	⅜"-16 N C	Nut	5
	⅜"	Lockwasher	5
	⅜"	Washer—Plain	5



ITEM 34 Instruction Plate

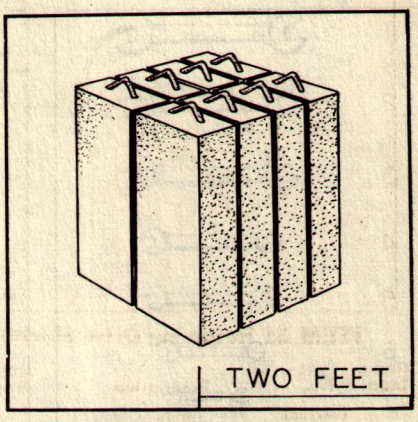
Group Index	Part No.	Description	Quan. Req'd
16-5	178-1615	Instruction Plate	1
	3/32"x1¼"	Drive Screws	6

PACKING LIST



ITEM 35 Drum Guards

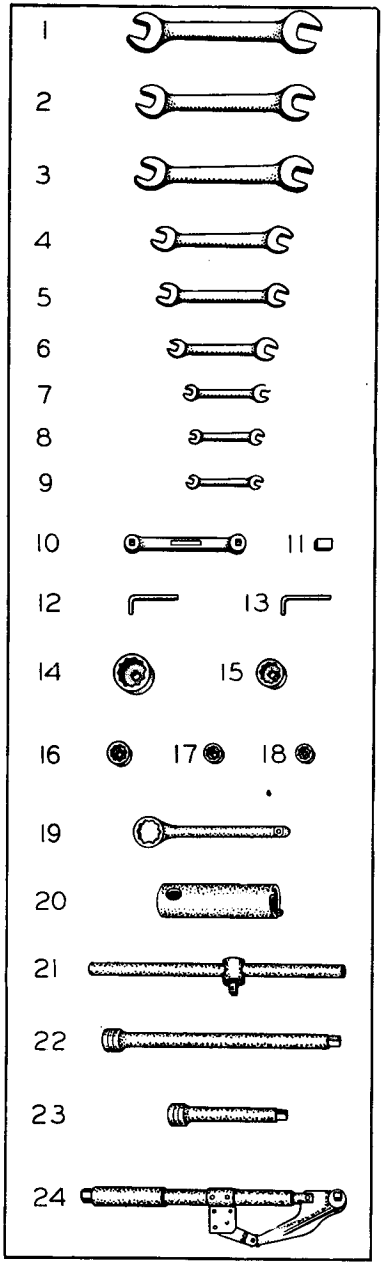
Group Index	Part No.	Description	Quan. Req'd
16-1	178-1655	Drum Guard—Right...	1
	178-1656	Drum Guard—Left....	1
	⅜"-16x1¼" NC	Capscrew	6
	⅜"	Lockwasher	6
	⅜"	Washer—Plain	2



ITEM 36 Counterweights

Group Index	Part No.	Description	Quan. Req'd
12-2	152-1897	Counterweight	8

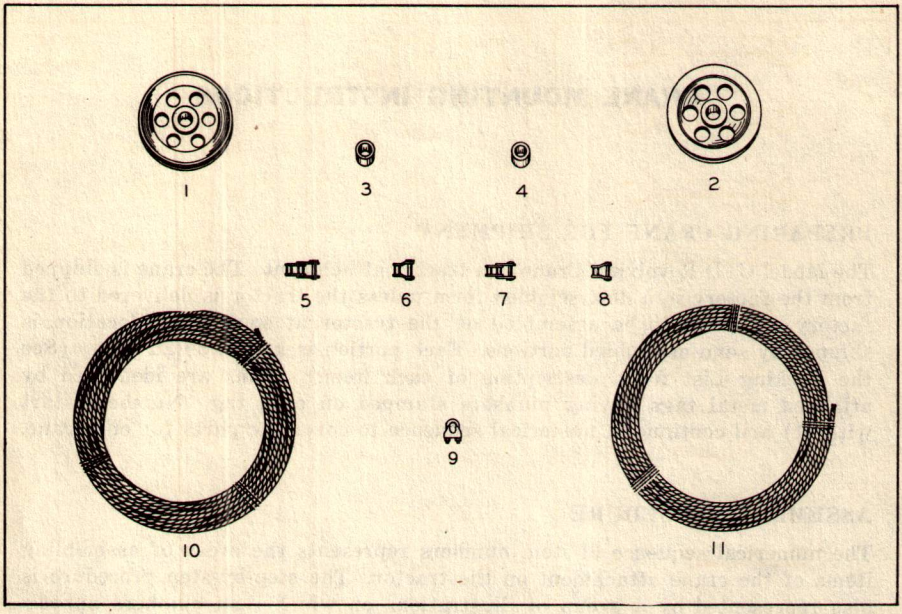
PACKING LIST



ITEM 37 Tools

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig 39	.....	Tools Group.....	1
1	1-545	Wrench–End–1¼"x1 7/16" 1039–J. H. Williams & Co.....	1
2	1-546	Wrench–End–1 1/16"x1¼"– 1037–J. H. Williams & Co.....	1
3	1-5459	Wrench–End–1"x1⅛"– 1735–J. H. Williams & Co.....	1
4	1-548	Wrench–End–⅞"x15/16"– 1033A–J. H. Williams & Co...	1
5	1-549	Wrench–End–¾"x⅞"– 1731A–J. H. Williams & Co...	1
6	1-5458	Wrench–End–⅝"x¾"– 1729–J. H. Williams & Co.....	1
7	1-5457	Wrench–End–9/16"x⅝"– 1727–J. H. Williams & Co.....	1
8	1-7231	Wrench–End–½"x9/16"– 3026–Plomb Tool Co.....	1
9	1-7230	Wrench–End–7/16"x½"– 3025–Plomb Tool Co.....	1
10	1-6917	Wrench–Extension– P-40–Sunnen Products Co.....	1
11	152-4649	Wrench–Drive	1
12	1-537	Wrench–Bristo–⅜"– The Bristol Co.....	1
13	1-540	Wrench–Bristo–½"– The Bristol Co.....	1
14	1-5454	Socket–1⅞"– 60060–Blackhawk Wrench Co..	1
15	1-6174	Socket–1 7/16"– 60046–Blackhawk Wrench Co..	1
16	1-6172	Socket–1⅛"– 60036–Blackhawk Wrench Co..	1
17	1-5460	Socket–1 1/16"– 60034–Blackhawk Wrench Co..	1
18	1-5569	Socket–1"– ST-1232–J. H. Williams & Co.	1
19	1-7223	Wrench–Box–1½"– MA-48–Owatonna Tool Co....	1
20	152-1731	Wrench	1
21	1-3104	Handle–Wrench– 47153–Sherman-Klove Co.....	1
22	1-3106	Extension–Long– 47162–Sherman-Klove Co.....	1
23	1-5570	Extension–Short– S115P–J. H. Williams & Co...	1
24	1-6865	Wrench–Tension– P-50–Sunnen Products Co.....	1

PACKING LIST



ITEM 38 Spare Parts

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig 41	.....	Spare Parts Group.....	1
1	BL-1	Sheave—10" O. D.—¾" Groove.....	1
2	151-1296	Sheave—10" O. D.—9/16" Groove.....	1
3	PLT-576-1	Bushing—1½" L. x 1¼" I. D. x 1¾" O. D.—SAE No. 64.....	1
4	1-5673	Bushing—For 151-1296 Sheave.....	1
5	1-6004	Chain—Consisting of one connecting link and one roller link—No. 433S—Diamond Chain Co.....	2 Pitches
6	1-6005	Link—Offset—No. 433S—Diamond Chain Co.....	1
7	1-5360	Chain—consisting of one connecting link and one roller link—No. 434S—Diamond Chain Co.....	2 Pitches
8	1-5361	Link—Offset—No. 434S—Diamond Chain Co.....	1
9	1-158	Clamp—Cable—½"	4
10	152-645	Line—Load—½"—190 ft. of 6x37 H. C. Preformed Improved Plow Steel Wire Rope	1
11	152-644	Line—Boom—½"—100 ft. of 6x37 H. C. Preformed Improved Plow Steel Wire Rope	1

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CRANE MOUNTING INSTRUCTIONS

PREPARING CRANE FOR SHIPMENT

The Model CTD Revolving Crane is a tractor attachment. The crane is shipped from the factory in a disassembled form unless the tractor is delivered to the factory. A crane to be assembled on the tractor at some other location is shipped by semi-assembled portions. Each portion is known as an item. (See the Packing List for a description of each item.) Items are identified by attached metal tags having numbers stamped on each tag. Numbers start with (1) and continue in numerical sequence to cover the parts for one crane.

ASSEMBLY PROCEDURE

The numerical sequence of item numbers represents the order of assembling items of the crane attachment on the tractor. The step-by-step procedure is also represented by a group of illustrations on which item numbers appear. Follow the advancing item numbers as they appear on the Packing List for correct assembly procedure.

The Packing List includes an illustration of each item in order that each portion of the crane may be immediately identified.

PREPARATION OF TRACTOR

The TD-18 "TracTracTor" is properly specified by International Harvester Company Specification IHC-G-179 Government Machine. Special provisions have been made in the tractor assembly to premit the attachment of the crane. Tractor attachments are supplied to accommodate the most desirable performance of the complete machine.

GENERAL INSTRUCTIONS

Do not assemble portions of the crane together securely without considering the need of shifting the matched parts slightly when one portion is attached to another.

All references to right, left, front or rear are considered with respect to the position of the operator.

CRANE MOUNTING INSTRUCTIONS

REMOVAL OF TRACTOR PARTS

Several parts of the tractor are not needed and if the tractor should be equipped with the following parts, remove them:

Fenders, including fender brackets
Air cleaner
Air cleaner pipes and hose connections

Figure 3 illustrates special tractor controls required for crane mounting and the general appearance through the operator's platform after the fenders and air cleaner are removed.

Special seat risers are supplied in order to raise the operator's seat to a suitable position. The tractor is also

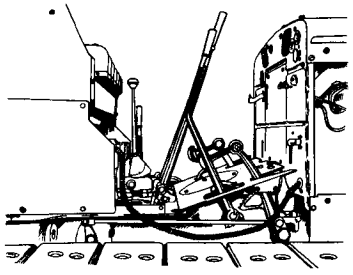


Figure 3 Removing Tractor Parts

equipped with a rigid track frame, which is required for mounting the crane.

International Harvester Company Specification, IHC-G-179 Government Machine, provides for the removal of the above mentioned parts as well as the installation of special parts mentioned

MOUNTING POWER TAKE-OFF AND HOISTS

REMOVAL OF PARTS FROM THE REAR FACE OF THE TRACTOR MAIN FRAME

Remove cork plugs from five places on the tractor rear case. See five places (A), Figure 4.

New draw bar brackets are supplied with the crane attachment. Remove the standard tractor brackets if the tractor is equipped with them.

Remove the cover plate (B), Figure 4, from the power take-off opening.

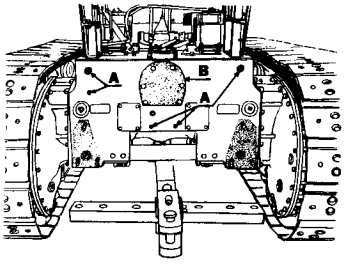


Figure 4 Removing Draw Bar Brackets and Case Cover

This prepares the rear case to receive items of the crane attachment.

ITEM 1 - Figure 5

HOIST CONTROL PEDALS

Two pedals operate the jaw clutches and brakes on the hoist worm shafts. The pedals are mounted above the tractor transmission. Operation of the pedals raises or lowers the boom and the load.

Remove operator's seat cushion.

Disconnect link (B), Figure 5, from left steering clutch lever.

Remove four 3 / 8 " capscrews from the transmission case cover on the tractor main frame. See Figure 5.

Place four 5/16" plain washers beneath the brackets which support the control

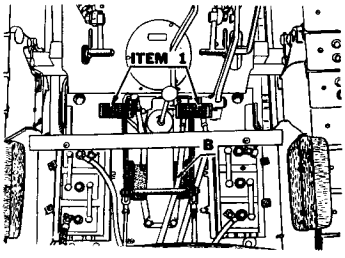


Figure 5 Mounting Hoist Control Pedals

pedals. Four capscrews having sufficient extra length with four plain washers and lockwashers are supplied with this item to fasten the brackets to the tractor case cover. See (Item 1), Figure 5.

Reconnect link to the left steering clutch lever.

CRANE MOUNTING INSTRUCTIONS

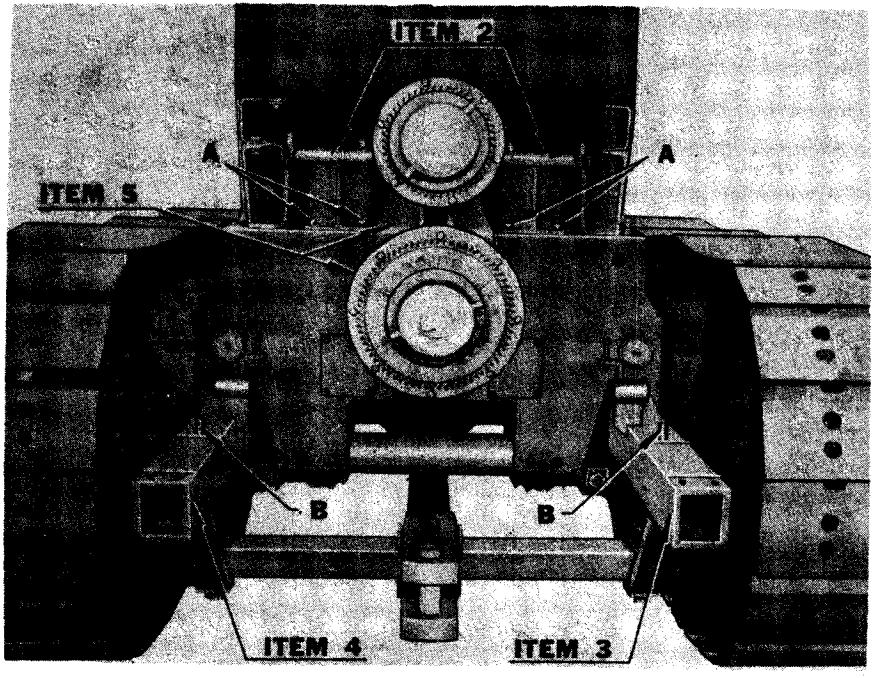


Figure 6 Mounting Parts on Rear Case

ITEM 2 - Figure 6

HOIST CONTROL BRACKETS

Two brackets that form bearings for lever shafts are a portion of the hoist worm shaft clutch and brake control.

Remove the four bolts designated (A), Figure 6. Place the brackets in position.

Fasten control brackets (Item 2), Figure 6, to the rear edge of the tractor main frame casting.

Connect links from control pedals to the two single levers mounted on the control shaft.

Do not lock yoke pins with cotter keys. The links must be adjusted later.

ITEM 3 - Figure 6

REAR SUPPORT–RIGHT

The support replaces the tractor drawbar bracket and also forms a support for the right side of the dual hoist assembly. The same studs and nuts required for the attachment of the tractor drawbar brackets will support this item.

Set the support (Item 3), Figure 6, in place. Use nuts and lock washers furnished with the tractor to hold the support.

ITEM 4 - Figure 6

REAR SUPPORT–LEFT

The left hoist support is identical to the preceding item except that it replaces the left tractor drawbar bracket.

Set the left support in place (Item 4), Figure 6, and bolt to the tractor, using nuts and lockwashers furnished for the original drawbar brackets.

Insert the ends of the tractor drawbar guide into the slots of both supports.

Slide the guide in place. Use two 1¼" capscrews that are supplied with the tractor drawbar brackets to hold the guide.

CRANE MOUNTING INSTRUCTIONS

ITEM 5 - Figures 6 and 7

POWER TAKE-OFF

The power take-off is coupled with the tractor drive by inserting the splined shaft through the rear opening of the tractor main frame casting. The power take-off assembly drives the hoists by a roller chain from friction clutches. V-belts which transfer the power through a countershaft to the crane revolving mechanism are also driven by sheaves on the power take-off assembly. The entire assembly mounts on the rear face of the tractor main case or frame.

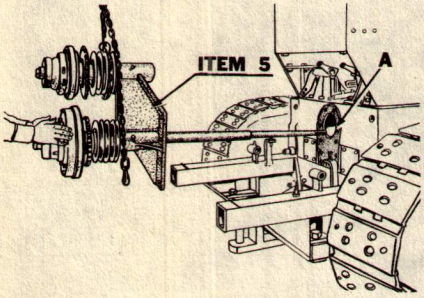


Figure 7 Inserting Power Take-Off Shaft

Place gasket supplied with Item 5 against the rear face of the tractor as designated (A), Figure 7.

Shellac gasket in place around the rear opening. Use an overhead hoist or some means of supporting the power take-off assembly. This permits the long shaft to be held level while it is inserted through the opening.

Rotate the lower shaft slightly in order to mesh the splines of the shaft with those of the tractor drive.

When the complete assembly is placed against the gasket, insert ¾" capscrews through the housing flange. Use lockwashers under the heads of capscrews.

NOTICE: Two capscrews on the left side of the power take-off bearing housing shall not be used at this time. Capscrews for holes located at the lower left quarter of the circular opening in the tractor case must be longer and will be inserted later when another item is assembled in place.

Tighten the six capscrews securely.

ITEM 6 - Figure 8

STUD

The stud, 1¼" in diameter, partially secures a belt idler support to the rear face of the tractor main frame casting.

Remove the cork plug from the left side of the tractor casting as illustrated in (A), Figure 8. Remove one nut and lockwasher and insert stud through the tractor frame casting.

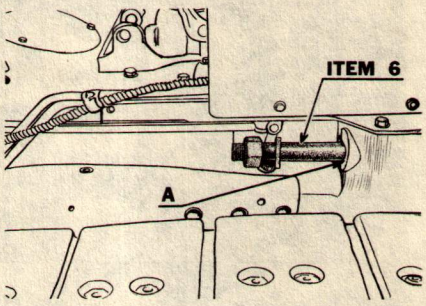


Figure 8 Placing Stud through Case

ITEM 7 - Figure 9

BELT IDLER

The belt idler is an adjustable idler pulley which is mounted between the drive span of the power take-off and the primary countershaft. The correct belt tension is established by raising or lowering the pulley on its mounting bracket. The mounting bracket of the idler also supports the primary countershaft.

Hoist the belt idler (Item 7), Figure 9, into position. The stud (Item 6) partially supports this idler assembly. Set nuts on both ends of the stud. Two shims are supplied for the right hand bolting plate of the bracket. Use one or two shims between the bolting plate and the power take-off bearing housing to fill the space between the parts.

Bolt the right hand portion of the idler in place with the two ¾" capscrews furnished. Place the 1" capscrew through the bolt hole in the lower left corner of the idler bracket and tighten all bolts or nuts securely.

CRANE MOUNTING INSTRUCTIONS

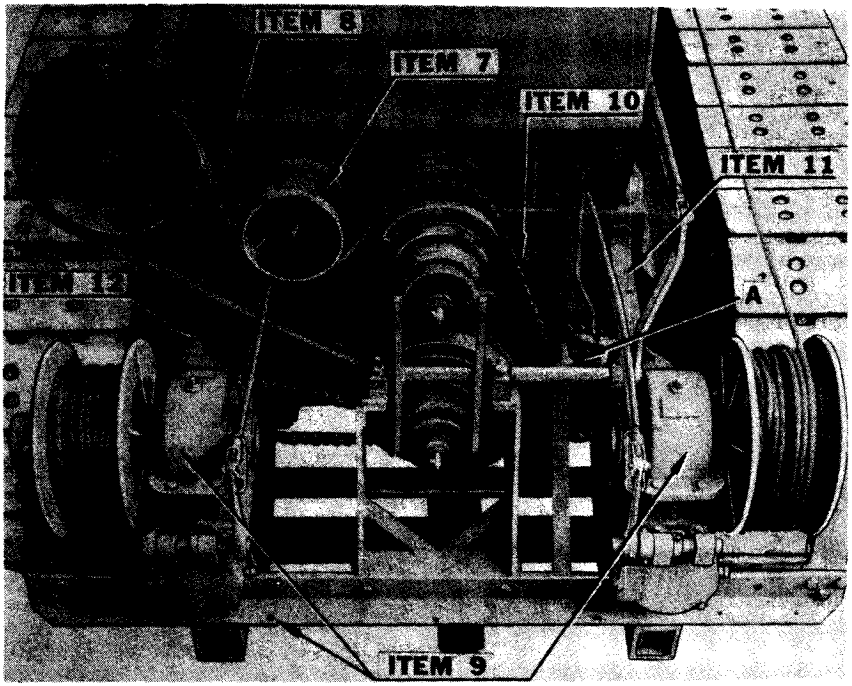


Figure 9 Power Take-Off and Hoist Assembly

ITEM 8 - Figure 9

POWER TAKE-OFF BELTS

Power take-off belts supply power to the reversing clutch for the hoist drive and drive the primary countershaft.

Place belts (Item 8), Figure 9, in grooves of both sheaves on power take-off assembly. Pull the belts to the left and place them under the idler pulley. Lay the belts over the upright angle portion of the idler bracket in order to hold them out of the way of following assembly operations.

Observe the course of the drive belts in Figure 9.

ITEM 9 - Figure 9

DUAL HOISTS

The dual hoist is a double worm gear driven unit. Alternate spools on the hoist elevate and lower the boom or load.

Use a crane or a similar lifting device to support the dual hoist assembly when it is guided into position.

Observe studs (B) in Figure 6. Raise the hoist assembly and hold in a level position as it is lowered on to its supporting brackets. Avoid stripping threads on studs (B), Figure 6. The two studs go through holes in the front base angle.

Fasten the rear angle of the hoist frame to the supports with four ¾"x6" capscrews. Tighten all capscrews or nuts on the hoist frame.

Check bolt tension on the hoist supports where the supports have been bolted to the rear portion of the tractor. Set the nuts firmly.

ITEM 10 - Figure 9

HOIST DRIVE CHAIN

The drive chain transmits power, both direct and reverse, to the worm gear driven hoists.

Observe proper course of the chain (Item 10) around all the drive sprockets shown in Figure 9. Connect chain. Adjust to the proper tension by means of an adjustment bolt on idler sprocket mounting (A) in Figure 9.

CRANE MOUNTING INSTRUCTIONS

ITEM 11 - Figure 9

RIGHT BRACKET

The right bracket serves as a brace between the rear face of the tractor and the hoist gear housing.

Two capscrews on the gear housing cover have sufficient extra length to clamp the forked end of the bracket (Item 11), Figure 9, to the housing cover.

Set the pin on the front upright plate of the bracket into the socket hole of the tractor case.

Clamp the bracket in place by two of the capscrews on the hoist gear housing cover.

ITEM 12 - Figure 9

LEFT BRACKET

The left bracket is a brace between the left hand hoist assembly and the idler pulley bracket.

Mount the forked end of the bracket (Item 12), Figure 9, on the hoist housing cover by the same procedure as described for the previous item. Fasten the opposite end of the bracket to the idler support with one ½" capscrew.

ITEM 13 - Figures 10, 11 and 12

POWER TAKE-OFF SHIELD

The shield for the drive belts protects the belts from grease and dirt exposed by the rear drive mechanism.

Set the shield in place. See (Item 13), Figure 10. Fasten the angle member on the right side of the shield to the right hoist brace. See (Item 13), Figure 11.

Set the left portion of the shield on the left hoist brace. See (Item 13), Figure 12.

Fasten the small brace between the left upright portion of the shield and the idler pulley support. See (Item 13), Figure 12.

Connect the brace to the upright portion of the shield on the right side and between the shield and seat support. See (Item 13), Figure 11.

ITEM 14 - Figures 10, 11 and 12

HOIST CONTROL LINKS

The hoist control links and fork assembly are a part of the control mechanism for operating jaw clutches and brakes on both hoist worm shafts.

Observe (Item 14), Figure 10. The right link to the brake lever has a slight bend downward for clearance. Connect this link between the right hoist brake lever and the vertical member of the bell crank lever mounted below the fuel tank.

In a similar manner connect the straight link between the brake lever and the bell crank lever located on the left side of the tractor case. See (Item 14), Figure 10.

The short link for operating the right worm shaft clutch has an offset bend for clearance.

Observe (Item 14), Figure 11. Assemble the shift fork and its lever shaft into the bearing on the hoist support.

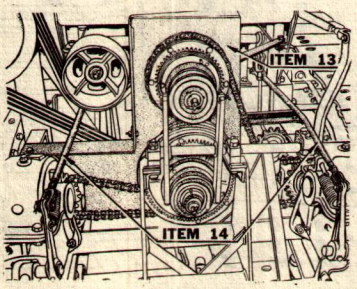


Figure 10 Mounting Shield and Hoist Control Links

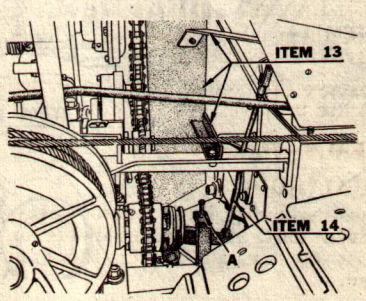


Figure 11 Hoist Worm Shaft Clutch Control—Right Side

13540-A

CRANE MOUNTING INSTRUCTIONS

Connect the link between the horizontal portion of the bell crank lever and the lever shaft which supports the jaw clutch fork. Repeat this procedure by connecting the remaining short link to the left hoist jaw clutch control. See (Item 14), Figure 12.

Check the position of the control pedals. Set the pedals at a convenient operating position by changing the position of the yokes on the control linkage. Links from the two foot pedals are connected to levers that mount on serrated shafts. Change the position of the two levers if necessary. Notice the adjustment bolt (A), Figure 11. Set the bolt at a position which will hold the jaw clutch member approximately 1/16" from complete engagement. Repeat the procedure of setting the adjustment bolt to hold the left jaw clutch member 1/16" from complete engagement. See (A), Figure 12. For the hoist brake adjustment, refer to Adjustment Instructions "Hoist Controls," Page 61 of Operations Section.

ITEM 15 - Figure 13

MAIN FRAME SUPPORTS

The main frame of the crane is partially supported by two brackets that fasten to the track frame casting. The supports form a shelf for the rear portion of the main frame base.

Attach the brackets to the tractor mounting pads against the inside face of the track frame casting. See (Item 15), Figure 13. Six ⅞"x2" capscrews and six ⅞" lockwashers are required for each support. Mount one support on each side of the tractor.

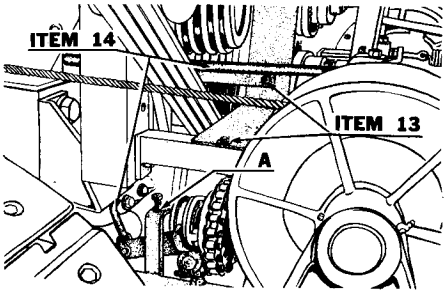


Figure 12 Hoist Worm Shaft Clutch Control—Left Side

MOUNTING MAIN FRAME

PREPARATION FOR MOUNTING MAIN FRAME

Several parts must be removed from the front portion of the tractor for a temporary period, then replaced after the main frame is mounted.

Remove the driving lights and exhaust mufflers. Remove radiator guard including guard side braces. Remove four bolts designated (A), Figure 13, from each side of the tractor. The bolts are located in the mounting pads at the base of the radiator shell.

Remove right and left crossbar brackets including U-bolts from tractor frame side channel. Loosen clamp bolts on wedge blocks slightly. See (B), Figure 13.

Remove bolts from both sides of the tractor main frame as designated at (C), Figure 13.

ITEM 16 - Figures 14 and 15

MAIN FRAME

The main frame of the crane supports the counterweight frame, sheave frame and the boom. The revolving mechanism and the mast column are mounted within the construction of the main frame.

Remove the upper capscrews at the front and rear portions of both engine side sheets. Also remove one capscrew from the side of the radiator shell. See

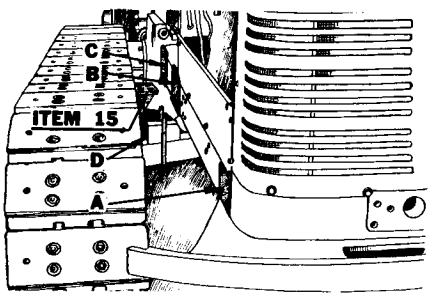


Figure 13 Preparing Tractor for Mounting Main Frame

CRANE MOUNTING INSTRUCTIONS

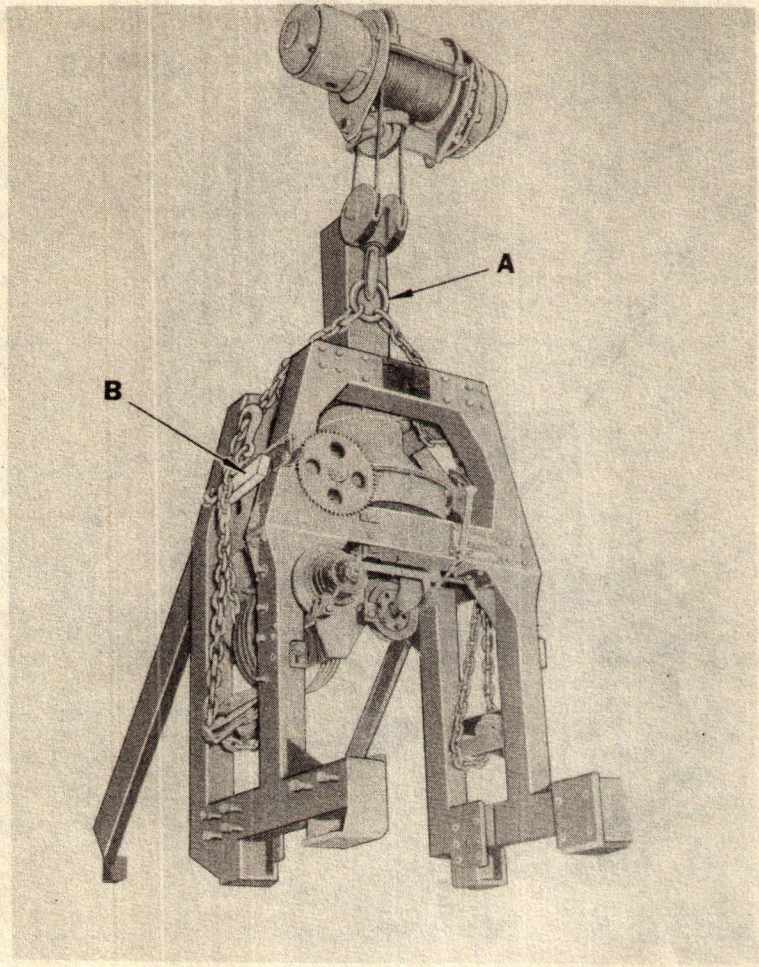


Figure 14 Lifting Main Frame and Mast

(A), Figure 15. Remove the front capscrew of the group that secures the side sheet on the operator's seat. Remove the same capscrews from both sides of the tractor.

It is necessary to remove the capscrews to allow the frame to be set onto the tractor. The frame is not likely to clear the heads of the capscrews as it is swung into position.

Special plates or shims are attached to the main frame before shipment. Observe (A), (B) and (C), Figure 13, showing position of shims. It is necessary to place the shims in the positions indicated after the frame is lowered in place.

Replace crossbar wedges on tractor crossbar if they should not be in position.

LIFTING THE MAIN FRAME—Figure 14

Before attempting to lift the frame, observe (A) in Figure 14. Notice the

CRANE MOUNTING INSTRUCTIONS

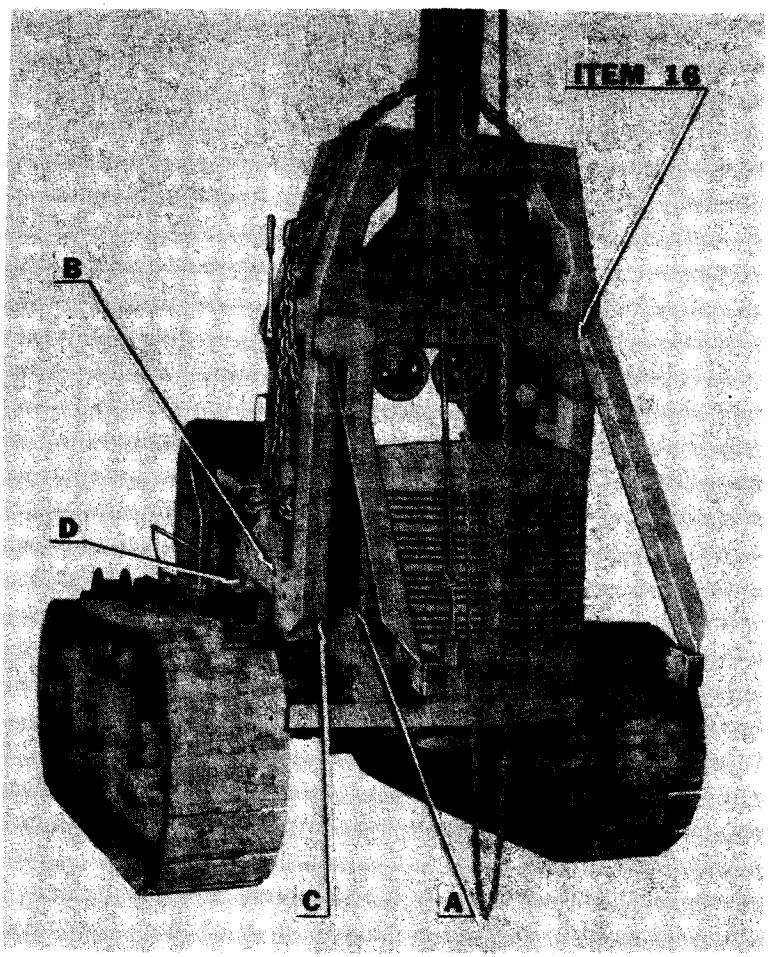


Figure 15 Placing Frame on Tractor

balancing point. The method of wrapping and hooking the chain is recommended.

A minimum of 12 feet clearance is required between the bottom of the hook and the floor to lift the frame in place. If the hoisting chain is attached and the frame raised according to Figure 14, place a block of wood or similar material across the frame members to protect the link indicated at (B). When preliminary steps described in this procedure are completed, pick up the frame and guide it into position as illustrated, Figure 15.

CAUTION—Do not allow the V-belts on the reverse shaft to be damaged while the frame is guided past the radiator. Hold the frame in position shown, Figure 15. Place lockwashers on six ⅞"x9" capscrews and insert the capscrews through both sides of the frame base. The location for the capscrews is indicated (B), Figure 15. Do not push threaded end of capscrews beyond the inside mounting face of the main

CRANE MOUNTING INSTRUCTIONS

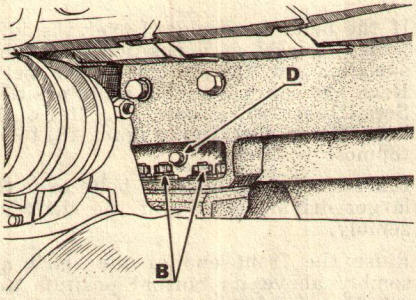


Figure 16 Frame Rear Support

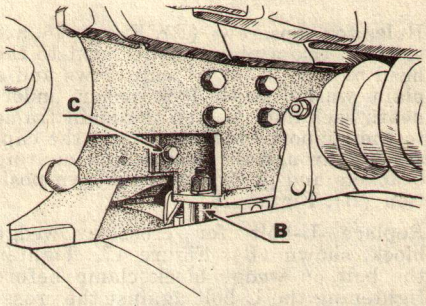


Figure 17 Frame on Crossbar Wedge

frame. Set the front portion of the main frame base on the tractor crossbar wedge. Set the rear portion of the main frame on the supports that are fastened to the track roller frame. Insert shims, shown (A), (B) and (C), Figure 13. Place the shims between the tractor and the main frame. Sway or jostle the frame until the capscrew holes line up but do not tighten capscrews at this time.

Place lockwashers on two 7/8"x4" capscrews and insert the capscrews through each side of the frame at position (C), Figures 15 and 17. Place lockwashers on two 7/8"x3½" capscrews and insert the capscrews through each side of the frame at position (D), Figures 15 and 16. Tighten only the capscrews at the rear portion of the main frame that are threaded horizontally into the tractor case.

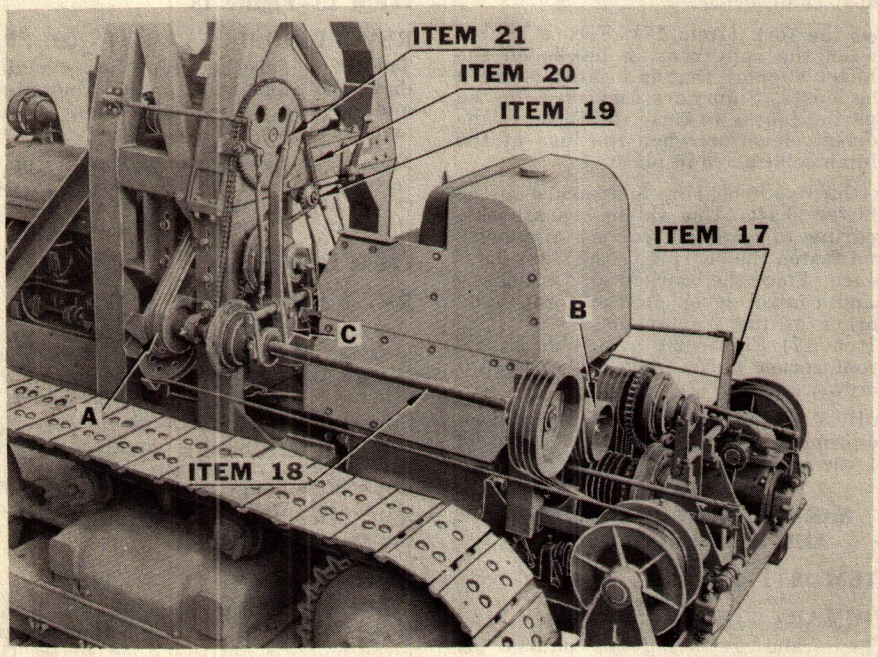


Figure 18 Countershaft and Revolving Drive

CRANE MOUNTING INSTRUCTIONS

Holes for capscrews (B), Figure 16, are slotted. Use a plain washer next to the head of four ⅞"x2¾" capscrews and a plain washer with lockwasher underneath each nut. Fasten the main frame to the support brackets, insert the capscrews through the bottom of mounting brackets and place nuts as shown position (B), Figure 16.

Replace U-bolt for crossbar wedge block, shown (B), Figure 17. Tighten the bolt on wedge block clamp before tightening the U-bolt against the crossbar.

Check the tension on all capscrews, bolts or nuts, securing the main frame and brackets to the tractor assembly. Tighten all these points securely.

ITEM 17 - Figure 18

POWER TAKE-OFF CLUTCH CONTROL

The power take-off clutch control operates a double shift fork which engages and disengages friction clutches on the hoist chain drive.

Set the fork (Item 17), Figure 18, between the split bearing blocks on the shifter support that is located between the hoists. Shims are furnished for the bearing blocks to raise the forks to the correct elevation when the lugs of the clutch collars are in place.

A third split bearing is attached to the shifter shaft. Use shims beneath this bearing to establish correct alignment and fasten the bearing to the right hoist brace. Place the bracket supporting the hand control lever on the right hand corner of the tractor main case. See (Item 17) Figure 20. Assemble on the front corner of the case with two capscrews.

Adjust the yoke ends on the control link to provide convenient operating position of the lever.

MOUNTING COUNTERSHAFT AND REVOLVING DRIVE

ITEM 18 - Figure 18

PRIMARY COUNTERSHAFT

The crane revolving mechanism is driven by the primary countershaft. The shaft is driven by V-belts from the power take-off. It extends forward and along the left side of the operator's seat.

If the belts were placed over the idler pulley bracket as a position previously specified for them, remove the belts. Raise the shaft assembly to its position. See (Item 18), Figure 18. Raise the belt idler pulley (B), Figure 18, to its topmost position.

Place the power take-off belts over the larger driving sheave of the shaft assembly.

Raise the front end of the shaft assembly above its normal position and set the revolving drive belts in the grooves of the front sheaves. Refer to (A), Figure 18.

The countershaft assembly is not adjustable for belt tension.

Bolt bearing cases to the main frame and to the rear support.

Refer to Adjustment Instructions "Countershaft Drive Belts" and "Power Take-Off Belts", Page 53 of the Operations Section. Adjust the belts as directed.

ITEM 19 - Figure 18

REVOLVING DRIVE CHAIN IDLER

The idler sprocket for the revolving drive chain has an adjustable mounting and is used for chain tension adjustment.

Mount the idler assembly on the main frame, shown (Item 19), Figure 18. Set the position of the sprocket as far from the center of the tractor as possible.

ITEM 20 - Figure 18

REVOLVING DRIVE CHAIN

The drive chain rotates the mast worm gear in either direction. This gear swings the boom from one side to the other.

Connect the drive chain (Item 20), Figure 18, then adjust the chain to the proper tension. See Adjustment Instructions "Revolving Drive Chain", Page 56 of the Operations Section.

ITEM 21 - Figure 18

REVOLVING DRIVE CONTROL

The shift control shaft has a double fork and is arranged with a hand control lever mounted on the same shaft. The control alternately engages and disengages two clutches at the left of the operator which provide rotation of the boom in either direction.

CRANE MOUNTING INSTRUCTIONS

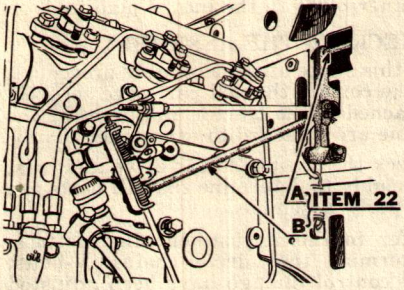


Figure 19 Engine Control Links

Loosen bolts supporting bracket (C), Figure 18. Loosen ½" capecrews on the clamps bolted to the outside prongs of the forks.

Place the shifter shaft (Item 21), Figure 18, between the split bearing blocks mounted on the support bracket. Raise or lower the mounting bracket to establish proper alignment and travel of the shifter mechanism. Connect upright link to the bell crank lever mounted on the main frame.

Lock bracket in place. Tighten bolts on clamps over the ears of the friction

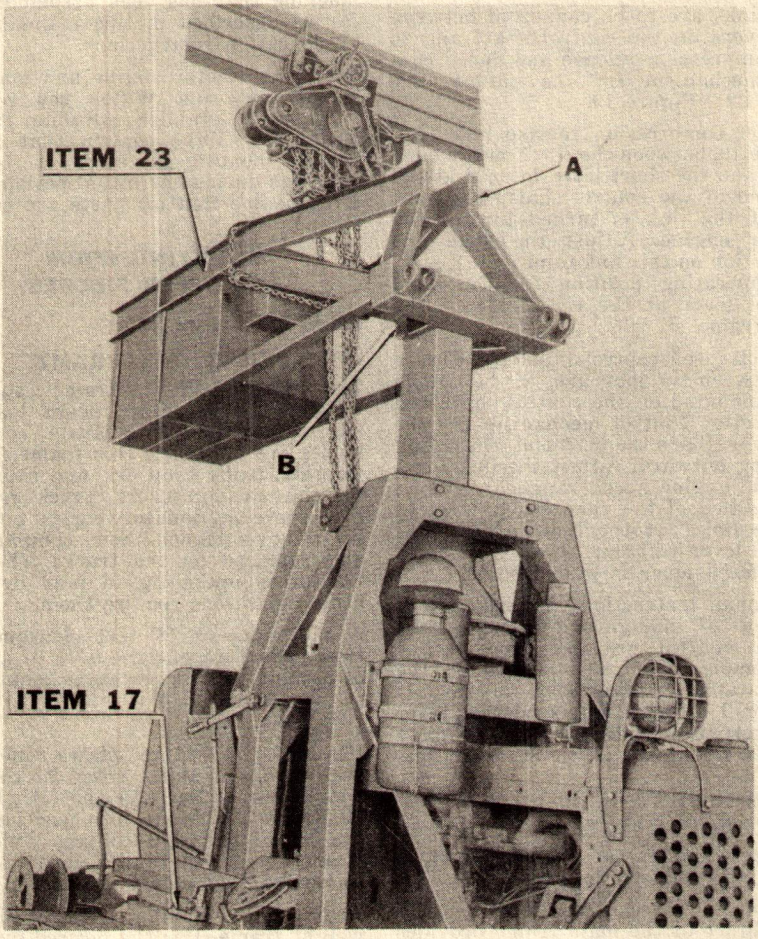


Figure 20 Placing Counterweight Frame

CRANE MOUNTING INSTRUCTIONS

clutch collars. Set yokes on the control link at a position for proper operation of the mast worm brake plunger. Refer to Adjustment Instructions. "Mast Worm Shaft Brake", Page 60 of the Operations Section.

CONNECTING ENGINE CONTROLS AND REPLACING TRACTOR PARTS

ITEM 22 - Figure 19

ENGINE CONTROL LINKS

A control shaft is mounted across the main frame directly below the mast housing. This control replaces part of the regular engine control ordinarily supplied with the tractor.

Two links are to be connected between the levers on the control shaft and to the compression release and speed control mechanism for the engine. See (Item 22), Figure 19.

Connect compression release link (A), Figure 19, between the lever on the dash panel and the short lever located at the left end of the control shaft. The bent end of the link is turned toward the tractor engine. Adjust the yoke end connection on this link to provide a suitable operating position for the hand control lever at the right side of the main frame.

Connect speed control link (B), Figure 19, between the long arm of the double lever mounted on the control shaft and the friction control mechanism for the governor. Place the bent end of the link pointing outward. Adjust the link for a suitable engine speed range by setting the position of the yoke end connection on the link. Set the link so the hand control lever will shut the engine "Off" when hand lever is pulled back.

Additional instructions regarding adjustment of linkage and levers on the tractor control are described in the Maintenance Manual published by the International Harvester Company. If additional information is needed, refer to International Harvester Company Manual, Repair Section, "Starting System."

REPLACEMENT OF TRACTOR PARTS—Figure 20

Replace the tractor radiator guard, headlamps and mufflers.

A mounting plate located on the right angle brace of the main frame provides a new location for the air cleaner. Refer to Figure 20.

Mount the air cleaner and connect air cleaner pipes to the intake manifold.

CHECKING THE ASSEMBLY

At this stage of the assembly procedure, make certain that all parts are securely attached to the tractor and items of the crane are attached to each other firmly.

Check the complete rear drive and hoist assembly to determine that all parts are properly assembled.

Refer to the Adjustment Instructions. Determine that drive chains, V-belts, and control linkage have been adjusted as described.

Lubricate the entire portion of the machine that has been assembled thus far as described in this manual under "Lubrication Instructions."

Start the tractor engine and make the initial test run. Watch the rotating parts and establish suitable running clearances. Make certain that no excessive heating develops in bearing housings during the initial period of operation. See that all parts are running freely.

MOUNTING BOOM AND UPPER FRAMES

ITEM 23 - Figure 20

COUNTERWEIGHT FRAME

The counterweight frame supports weights which offset boom loads to maintain balance. Separate compartments are built into this frame for the weights, track grousers, and capscrews for the track grousers. Track grousers also serve as counterweights but may be removed from their compartment and replaced on the tracks when the tractor is operating in mud or when other conditions require them.

A minimum of 18 feet clearance between the floor and the hook of a crane of similar loading device is required to set the frame in place. Refer to (Item 23), Figure 20.

Remove two clamp plates, including hardware, and shims from the counterweight frame. See (A) and (B), Figure 20. Hoist the frame into position over the top of the mast column. Guide the frame down the column until it comes to rest on the column shoulder.

Replace the clamps on the counterweight frame. Use the desired quantity of shims between the plates to permit the capscrews to set firmly.

CRANE MOUNTING INSTRUCTIONS

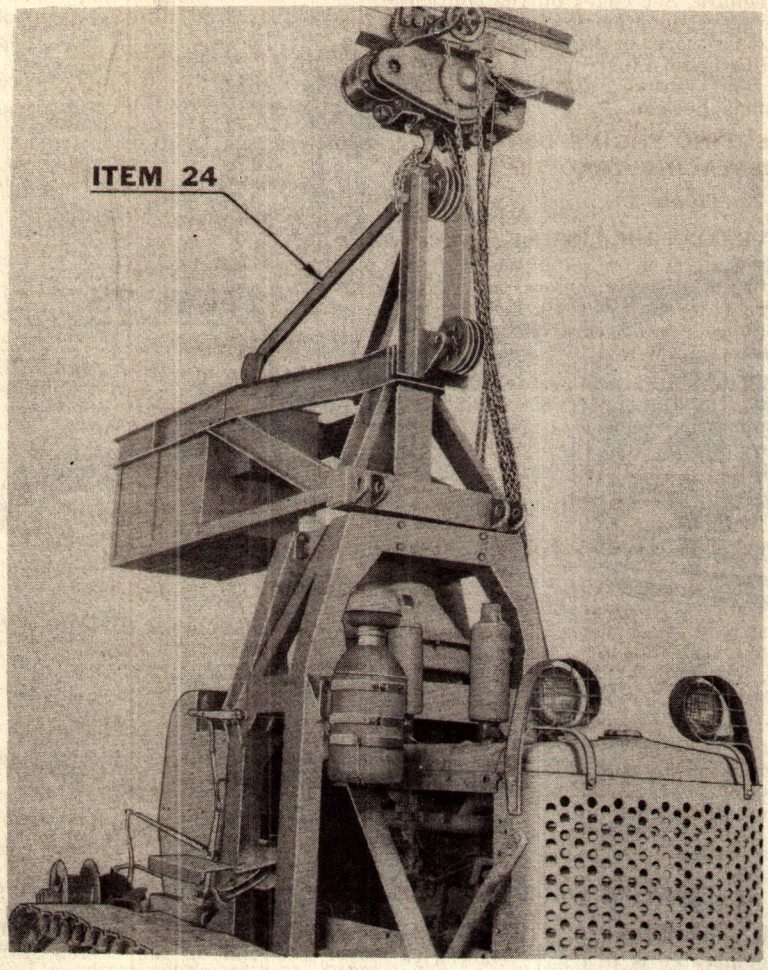


Figure 21 Placing Sheave Frame

ITEM 24 - Figure 21

SHEAVE FRAME

Sheaves are mounted in the upper frame structure which receive the boom and load cables.

Approximately 18 feet clearance is needed to hoist the frame in place. Set the frame on the counterweight frame and fasten in place. See (Item 24), Figure 21.

ITEM 25 - Figure 22

BOOM COLUMN

The boom supplied with the crane assembly is 30 feet long. The bridle sheave is connected to the boom point with a ¾", 6 x 19 wire improved plow steel cable having a hemp center.

Allow the point of the boom to rest on the floor or ground, then lift the pivot end of the boom in position. See (Item 25), Figure 22.

CRANE MOUNTING INSTRUCTIONS

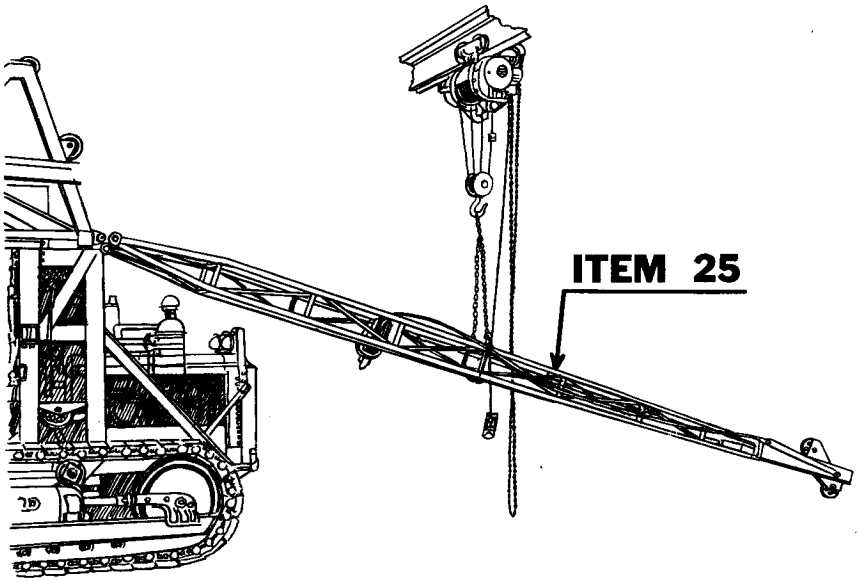


Figure 22 Lifting Boom

ITEM 26 - Figures 23 and 24

BOOM CABLE

The boom cable is to be reeved in five parts between the sheave frame and the bridle sheave. This cable is ½", 6 x 37 strand wire, and is 100 feet long. It is made of improved plow steel and has a hemp center.

Study diagram, Figure 24, which illustrates the reeving of the cables. Unreel cable (Item 26) and lay it out full length. Rotate the cable until there is no evidence of twists or kinks, then thread it downward and through the mast column. Lay the cable over the left lower sheave in the sheave frame. Lead it out the left side of the main frame and to the left drum, then clamp it to the drum flange. Refer to (A), Figure 25. Place the loop of the U-bolt over the end of the cable. Start the tractor engine and reel the cable on the drum. Again, eliminate kinks or twists as this is being done. Spool approximately one-half of the cable.

Refer to Figures 23 and 24. Lead the cable through the left sheave in the bridle block, then to the left upper sheave in the sheave frame. Repeat the procedure for the remaining two sheaves. Attach the dead end of the cable to the bridle sheave and clamp it in place with three cable clamps. Place nuts on cable clamps opposite cut side of the cable.

CRANE MOUNTING INSTRUCTIONS

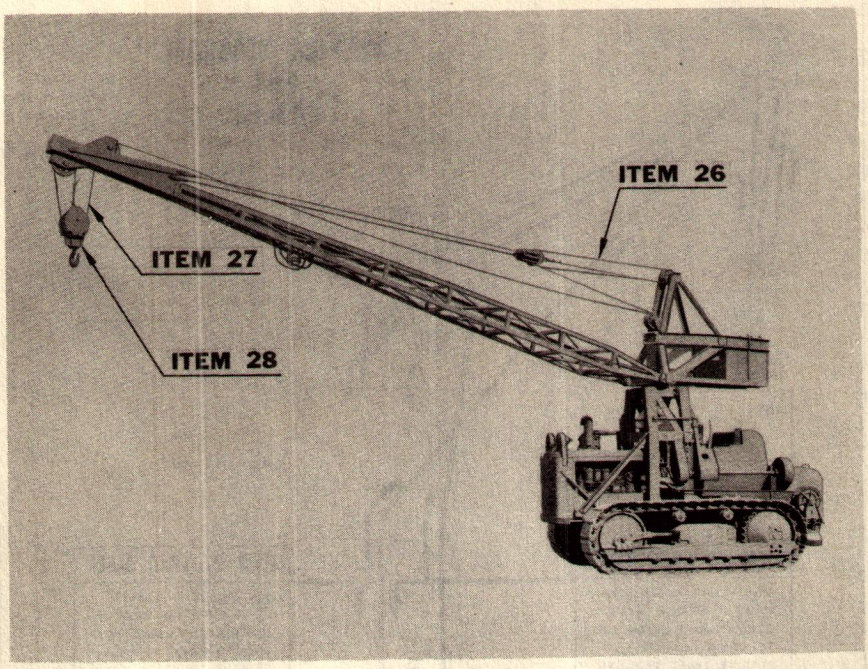


Figure 23 Boom and Cables

ITEM 27 - Figures 23 and 24

LOAD CABLE

The load cable is reeved in three parts between the boom point and the hook block. This cable is ½" diameter, 6 x 37 strand wire and is 190 feet long. It is made of improved plow steel and has a hemp center.

Lay the cable over the right hand lower sheave of the sheave frame, thread it downward and through the mast column.

Lead the cable out the right hand side of the frame and repeat the procedure of spooling the cable on the right hand drum as was done for the boom cable.

Remove the twists or kinks in the line. Lead the cable over the upper boom point sheave and downward. See (Item 27), Figure 23.

ITEM 28 - Figure 23

SWIVEL HOOK BLOCK

The block assembly is equipped with a ball bearing swivel hook for picking up loads. It is also equipped with a single sheave.

Thread the load cable through the hook block. Loop the cable over the lower boom point sheave and downward to the hook block. See (Item 28), Figure 23. Attach the dead end of the cable on the hook block with three cable clamps. Eliminate twist from the cable and place the nuts or the cable clamps opposite the cut side.

CRANE MOUNTING INSTRUCTIONS

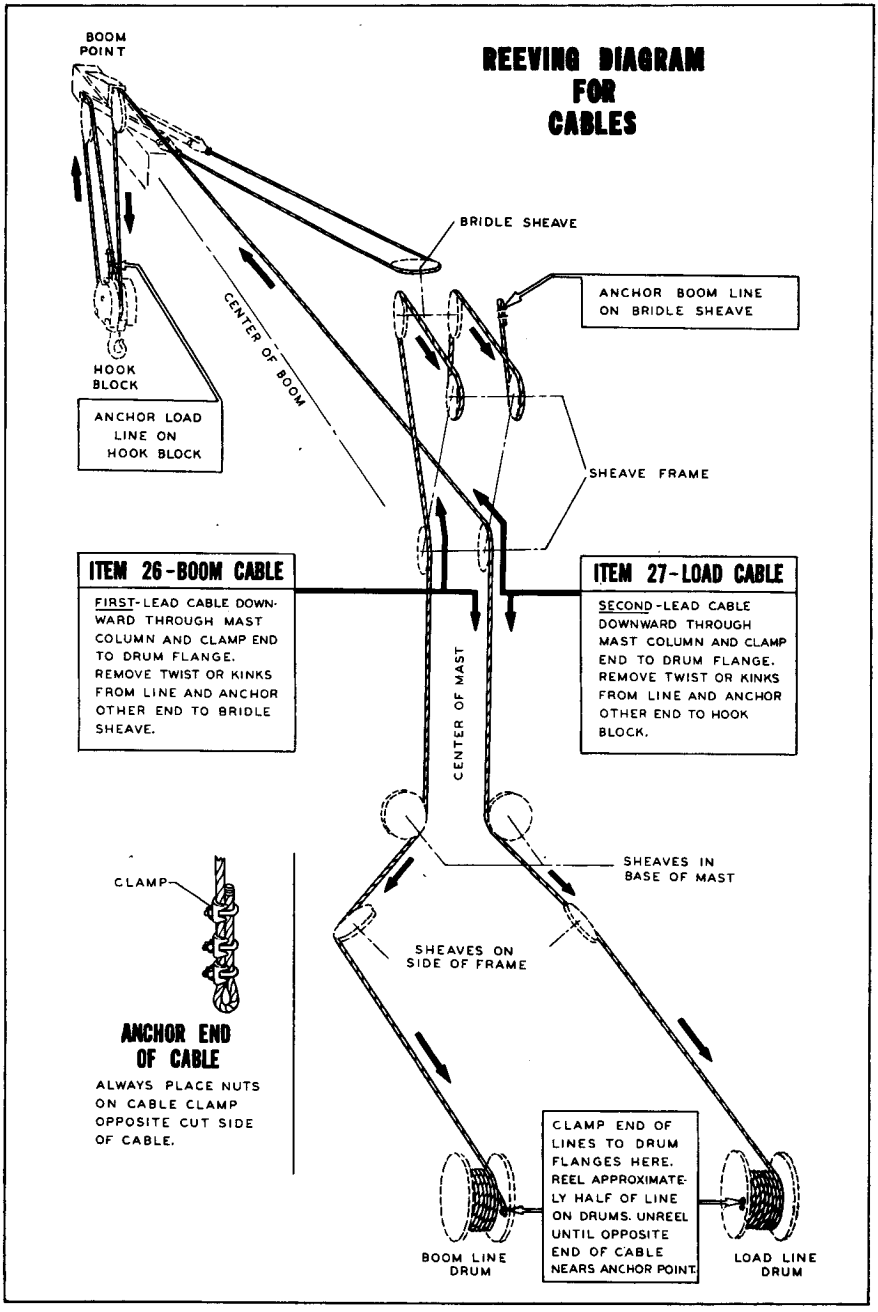


Figure 24 Reeving Diagram for Cables

CRANE MOUNTING INSTRUCTIONS

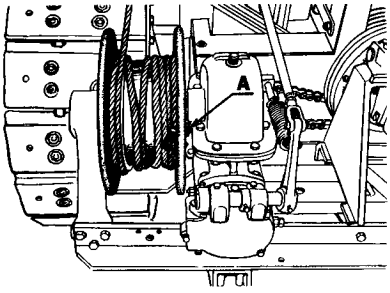


Figure 25 Clamping Cables to Drum Flange

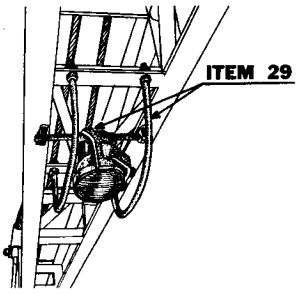


Figure 26 Position of Boom Light

ITEM 29 - Figure 26

BOOM LIGHT BRACKET

Approximately two-thirds the distance from the base of the boom, provision is made for mounting a lamp. The lamp is supported by a bracket which is allowed to swing as the boom is raised and lowered. This mounting permits the beam of light to shine downward and allows the lamp to illuminate the area around the hook block for night operation. Two rod guards protect the lamp. The guards are furnished as a portion of this item.

NOTICE—The lamp assembly is not supplied with the crane attachment.

Place the shaft, on which the bracket is assembled, through the lugs on the bottom angles of the boom. See (Item 29), Figure 26. Place machinery bushings over the outer ends of the pivot shaft and lock the shaft in place with cotter pins.

Fasten the rod guards in place on opposite sides of the lamp. See Figure 26.

ITEM 30 - Figure 27

FRONT COUNTERSHAFT SHIELD

The shield protects the drive belts between the primary countershaft and reverse countershaft.

Place the shield over the sheave located on the front end of the countershaft. Bolt the shield to the main frame with three capscrews provided. See (Item 30), Figure 27.

ITEM 31 - Figure 27

REVOLVING DRIVE SHIELDS

The revolving drive shields protect the operator from the roller chain, friction clutches and sprockets which drive the mast worm gear.

Refer to the link and bell crank lever designated (A) on Figure 27. Disconnect the link and remove the bell crank lever. Raise the main shield over the revolving drive control lever. See (Item 31), Figure 27.

Before fastening the shield to the main frame, set the back plate of the shield under the outside edge. Place clips on the shield back plate inside the main shield flange. Assemble the back plate to the shield.

The smaller back plate covers the span of drive chain between the idler sprocket and the worm drive sprocket. Place this portion of the shield assembly over the upper right hand flange of the main shield. Fasten all portions of the revolving drive shields to the main frame. Replace bell crank lever and re-connect the control link.

ITEM 32 - Figure 27

REAR SHIELD

The rear shield forms a housing or cover to protect the rear drive and hoist mechanism.

Place the rear shield over the rear drive and hoist gear housing. The outside face of the shield sets next to the inside flange of the hoist drums. Refer to (Item 32), Figure 27.

CRANE MOUNTING INSTRUCTIONS

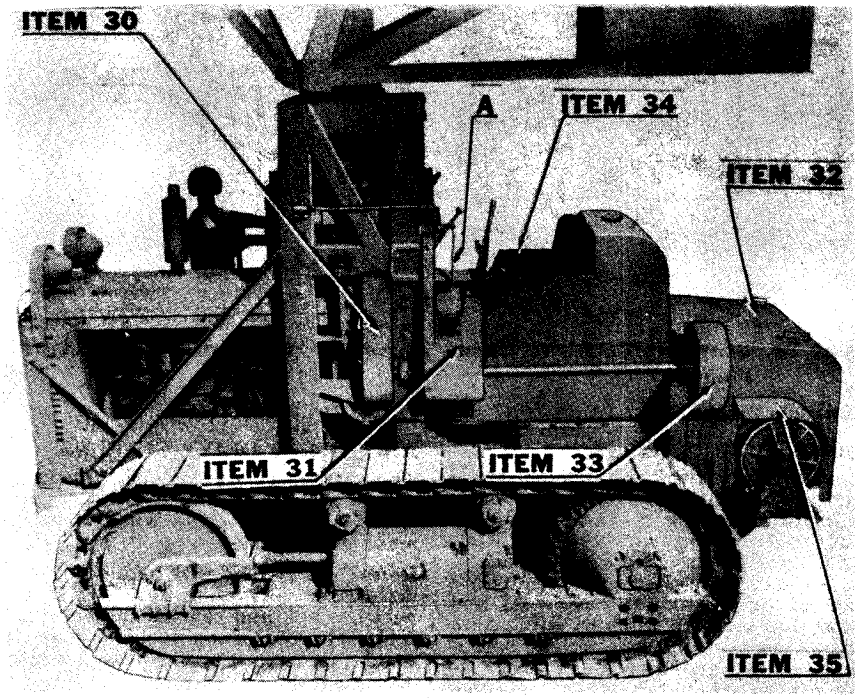


Figure 27 Mounting Shields

Fasten the shield to the angle members of the hoist frame and to the seat riser on the right side.

ITEM 33 - Figure 27

REAR COUNTERSHAFT SHIELD

The shield is a protector for the drive belts and driven sheave on the primary countershaft.

Slide the lower plate of the shield between the load cable and the countershaft support. See (Item 33), Figure 27. Attach the shield to the main rear cover.

ITEM 34 - Figure 27

INSTRUCTION PLATE

The instruction plate is placed on the right arm rest of the operator's seat. The two shift positions of the crane hoist lever are designated on this plate.

Lay the instruction plate on the right arm rest of the operator's seat so that it may be read from the operator's position. Use the holes in the plate as a guide and drill through the arm rest with a number 44 drill. Attach the plate with drive pins.

ITEM 35 - Figure 27

DRUM GUARDS

Two shields are furnished as a guard against cable breakage for both right and left hand hoist drums.

Bolt a shield to each side of the main cover as shown (Item 35), Figure 27.

CRANE MOUNTING INSTRUCTIONS

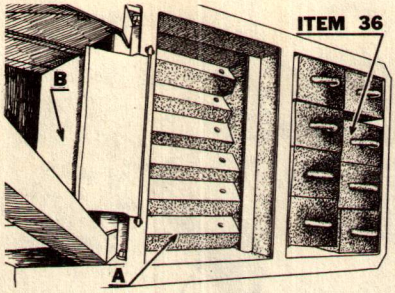


Figure 28 Compartments in Counterweight Frame

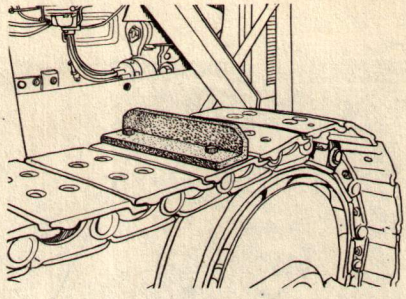


Figure 29 Track Grousers

ITEM 36 - Figure 28

COUNTERWEIGHTS

Each counterweight weighs 500 pounds. Eight counterweights are supplied making a total of 4,000 pounds of weight to offset the load on the boom.

Raise each weight and set in place in the counterweight frame as shown (Item 36), Figure 28.

CHECKING THE ASSEMBLY

The assembly of the crane is completed if the preceding instructions have been followed. Make a final test run and inspect the machine thoroughly. Make certain the machine has been lubricated at all points designated on the Lubrication Chart. Check the crane to determine if all adjustments have been made properly. See "Adjustment Instructions."

Refer to the International Harvester Company Maintenance Manual on the tractor for the lubrication or adjustment of any portion of the tractor and engine.

MOUNTING TRACK GROUSERS

Compartment (A), Figure 28, is a place of storage for the track grousers. The grousers serve as extra counterweights.

If grousers are needed during muddy conditions or other circumstances requiring them, fasten the grousers to the track plates as illustrated, Figure 29.

The box, designated at (B), Figure 28, is a compartment for the storage of capscrews, nuts and lockwashers to be used when attaching the grousers.

SHIPMENT OF CRANE AND TRACTOR

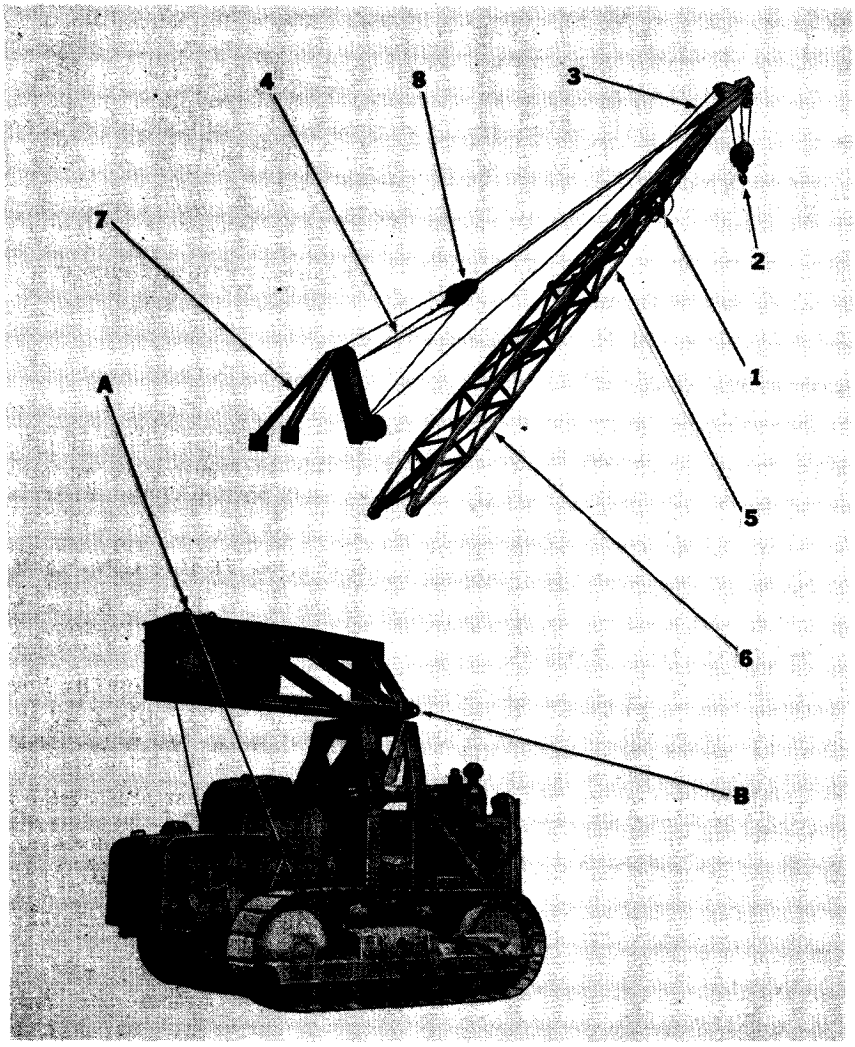


Figure 30 Removal of Parts for Shipment

SHIPMENT OF CRANE AND TRACTOR

SHIPMENT BY RAIL OR TRUCK

The length of the boom and overall height of the machine must be considered when the tractor mounted crane is prepared for shipment by rail or truck. Certain portions of the crane assembly should be removed. A tractor and crane attachment shipped as a unit require a portion of the crane assembly to be removed as illustrated,Figure 30. The boom, lines, bridle sheave and sheave frame, shown in the upper portion of the illustration, indicate the portion of the crane to be disassembled.

By removing the upper frame portion (7), shown in Figure 30, the overall height is reduced approximately 3½ feet. See overall dimensions shown Page 2 of the Operations Section. It is an essential requirement to remove the 30-foot boom.

Early models of the crane attachment are equipped with booms constructed as a single piece. The booms on later models are built in two sections. The late construction has pin joints located at the ends of the two joining sections. The two-piece construction reduces the problem of handling a boom of full length. Dividing the boom into two sections permits the complete machine to be placed in one crate or box for export shipment if such preparation for shipment is required.

DISASSEMBLY FOR SHIPMENT

Refer to Figure 30 showing the boom and upper portion of the frame which must be disassembled. As the parts are removed, replace all capscrews, pins or cable clamps in their respective positions. Fasten all small pieces so they will not be lost during shipment.

Lower the boom to a position below horizontal in order that the boom lamp (1) and swivel hook block (2) can be reached from the ground.

Disconnect wire from the boom lamp and remove guards, lamp, and lamp bracket (1). Coil the light wire and attach it to the main frame in a manner that the wire may readily be reconnected.

Loosen cable clamps and disconnect cable anchored on the hook block (2).

Reel the load line (3) on the hoist drum until approximately 10 feet of cable remains on the outside of the mast column. Do not reel in all of cable. Leave a portion of cable hanging freely outside the mast column, thereby avoiding the need for threading the cable through the mast column upon reassembly.

Lower the boom until it rests on the ground. Loosen the cable clamps on boom line (4) and remove the cable from the anchor point on the bridle sheave (8).

Hold the boom and disconnect it from the counterweight frame. This is done by removing pins from the hinge point at the base of the boom. See (B), Figure 30.

SHIPMENT OF CRANE AND TRACTOR

It is not necessary to disconnect the double bridle line attached to the point of the boom.

Be cautious and do not drop the boom, or the lower section (6), if it is a two-piece boom, into the tractor radiator and damage lamps or other parts protruding from the hood of the engine.

A boom constructed in two sections can be handled by separate sections if limited loading equipment is available. If the end section (5) of a boom of this type is first removed, make certain that the lower portion of the boom (6) is held in position above the tractor radiator to prevent damage. Separate the two-piece boom by removing connecting pins at the mid-span. Replace the connecting pins and lock them in place to prevent them being lost.

Reel in boom line (4) until approximately 10 feet of cable remain on the outside of the mast column.

Remove the six capscrews from each side of the sheave frame (7) where this upper portion bolts to the counterweight frame. Lower the frame (7) from this topmost position.

Loop or tie ends of boom line and load line to a portion of the counterweight frame so they may be readily placed in the sheave grooves upon reassembly. Reel in the slack portion of the lines but do not pull the lines tightly against the rim of the mast column and cut them.

LOADING TRACTOR

Proceed to load the tractor. The parts that have been removed should establish an overall height of approximately 12 feet from the floor of the truck or flat car. Overhead clearances for bridges or other obstructions on railways or highways should permit movement of the machine without requiring special routing.

Load the machine on the truck or flat car including all portions which were disassembled. Block the tracks to prevent forward or backward movement while in transit. Tie the machine to the bed of the truck or flat car in the usual manner.

When the tractor is tied and blocked in place, set the tractor brakes and lock the brake pedals in the applied position by means of the ratchet locking device on the tractor brake pedals.

Tie the counterweights and frame with several strands of heavy wire or a portion of cable to eliminate the tendency for the counterweight frame to swing while the machine is in transit. Thread and make a loop of the cable or wires through the pickup loops on the counterweights. See Position (A), Figure 30. Tie the ends of the cable or wire to each side of the tractor by anchoring the ends around the tracks as indicated in Figure 30.

This should complete the preparation for movement by rail or truck. Make certain all disassembled portions of the machine

SHIPMENT OF CRANE AND TRACTOR

are grouped together and kept with each unit. Place the disassembled portions about the machine and fasten them so they will not be lost.

REASSEMBLY AT DESTINATION

Upon arrival at destination, remove tie-down wires attached to the counterweight frame. Remove all blocks or other means of anchoring the machine made before shipment and proceed to unload the machine.

Refer to Figure 30 showing the boom, lines and other parts to be reassembled. Raise the full length of the boom and connect it to the counterweight frame with hinge pins (B), shown Figure 30. If the boom is a two-piece construction and it is desirable to handle the separate sections, attach the lower section (6) to the counterweight frame. Then connect the two sections at the mid-point with lock pins. Proceed cautiously and do not drop the boom into the tractor.

Hoist the sheave frame (7) to its position and attach it to the counterweight frame with six capscrews on each side.

Disconnect boom line (4) from the counterweight frame and unreel a considerable length of line in order to thread the line through the sheaves and blocks. Refer to Item 26, Figure 24, showing the proper method of threading the lines. Make certain there is no twist in the line, then anchor the end of the line to the bridle sheave (8), Figure 30. Place the nuts on cable clamps opposite the cut side of the line and set the three clamps firmly.

Make certain the boom connecting pins and hinge pins are locked in place. Raise the boom to a position where the end of the boom can be reached from the ground.

Disconnect the load line (3), Fig-30, from the counterweight frame and lead the line to the upper sheave of the boom point. Remove twists or kinks from the line. Refer to Item 27, Figure 24, showing the course of the load line through the boom point and swivel book block (2). Anchor the cable on a hook block with the three cable clamps provided. Place nuts of the clamp opposite the cut side of the line and set the nuts firmly. Replace the boom lamp, brackets and guards shown in position (1), Figure 30. Uncoil the light wire and reconnect it to the boom lamp. This should complete the reassembly of the parts which were removed prior to shipment.

Although the machine may appear to be ready for operation, it is well to recheck the assembly. Make certain sheave and boom pins are firmly locked. Test the machine and make certain the performance is suitable before resuming operation. Lubricate the machine as shown on the lubrication instructions. Refer to adjustment instructions or operating instructions if difficulty is experienced.

PREPARING CRANE FOR STORAGE

Protective measures applied to the crane attachment previous to storage are relatively few. A machine to be stored for a period longer than 30 days requires the general good practice of cleaning and protecting the mechanism with a suitable lubricant to prevent corrosion or rust.

LUBRICATION

Protect cables or wire lines by applying a coating of rust preventive lubricant to the entire length of all wire lines. Lubricate the entire mechanism as described on the lubrication chart with the exception of mast and hoist gear housings. Flush the gear housings and fill with fresh lubricant before resuming operation.

RELEASING DRIVE BELT TENSION

V-belts driven from the power take-off and between the countershafts should be preserved by releasing the belt tension. To release the tension on the belts, raise the adjustable idler pulley enough to allow considerable slack or looseness on the power take-off belts. Set the reverse countershaft of the crane revolving mechanism to a lower position, thereby releasing the tension on the countershaft drive belts.

FRICTION CLUTCH PLATES

Place the Crane Hoist Lever and the Boom Swing Lever in neutral position. This releases compression on friction clutch plates and eliminates the possibility of the plates sticking.

Lubricate the machine and check all adjustments when the machine is removed from storage.

ABNORMAL OPERATING CONDITIONS

No portion of the crane mechanism is affected by abnormal operating conditions except the need of changing to lubricants more suited for extreme high or low temperatures. Lubricants specified on the lubrication chart would ordinarily cover a temperature range from 0° Fahrenheit to plus 90° Fahrenheit.

OE LUBRICANTS–ENGINE OIL

Application of engine oil from a hand oil can is specified on the lubrication chart as a proper lubricant for minor points of friction. Ordinary practice for maintaining oil in a fluid state at extreme low temperatures is accomplished by adding approximately 20 per cent kerosene by volume to the oil. However, a mixture of kerosene should be avoided if the supply of a more suitable lubricant is available. Satisfactory results may be obtained by increasing the amount of kerosene with SAE 10 oil and using the mixture when temperatures approach as low as minus 20° Fahrenheit.

GO LUBRICANTS–GEAR OIL

The mast gear and hoist gear lubricant specified as GO on the lubrication chart signifies SAE 90 universal gear oil. Operation in temperatures above plus 90° Fahrenheit usually requires the use of gear lubricants having a specification of SAE 140. It is permissible to mix 10 per cent to 15 per cent kerosene by volume to gear oil having a specification of SAE 90 when operating in temperatures below 0° Fahrenheit. The introduction or supply of improved types of lubricants may eliminate the mixture of kerosene if they are approved for use in a greater range of temperatures.

MUDDY OR DUSTY CONDITIONS

Good practice after operating in muddy or dusty conditions applies to cleaning the machine more often than during normal operating conditions. Mud or water should be removed if it is thrown into the power take-off or driving mechanism mounted on the rear of the tractor. Adequate lubrication is the best protection. Gear housings and bearings are sealed from dirt or water. After the machine has been exposed to severe conditions, clean it thoroughly and lubricate the entire crane attachment. It is recommended to flush and refill the hoist gear housings if this portion of the machine has been submerged in water.

LUBRICATION CHART

LUBRICATION CHART
CRANE ASSEMBLY ONLY

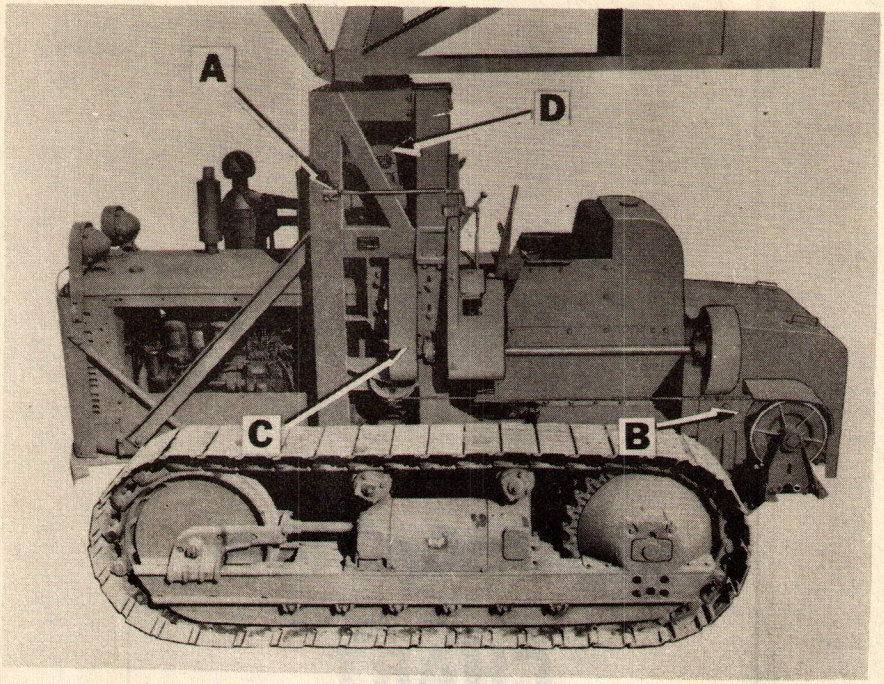


Figure 31 Points of Lubrication on Left Side

See close-up views on opposite page.

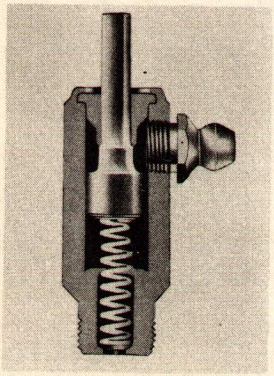


Figure 32 Measuring Fitting

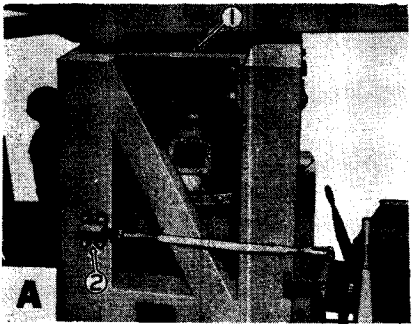
A measuring type Alemite fitting, shown Fig. 32, has been installed at various points for the lubrication of anti-friction bearings. The bearings are positively sealed from dirt and moisture and require only a small quantity of lubricant at each application. A charge of fresh lubricant from the pressure gun moves the plunger down. This action forces into the bearing all lubricant previously trapped below the plunger. When the plunger moves down to the stopping point no more lubricant can be forced into the fitting from the pressure gun. After a short interval the plunger returns to its original position. The next application of the pressure gun forces the trapped portion of lubricant into the bearing.

Some occurrence may require the machine to be disassembled and bearings removed where this type of fitting is used. Upon reassembly of the parts, it is important to remove the measuring fitting and use an ordinary one while filling the lubricant chamber about the bearing. Replace the measuring fitting after a normal amount of lubricant has been supplied.

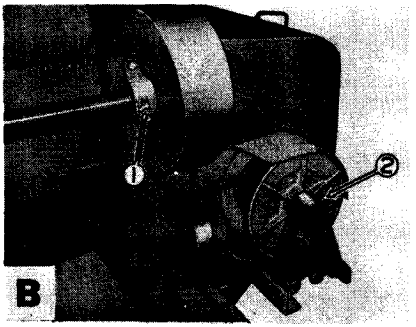
Clean dirt from grease fittings before applying lubricant gun.

LUBRICATION CHART

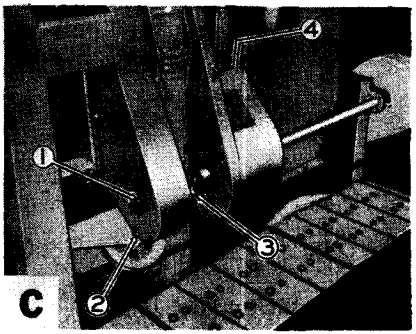
CRANE ASSEMBLY ONLY



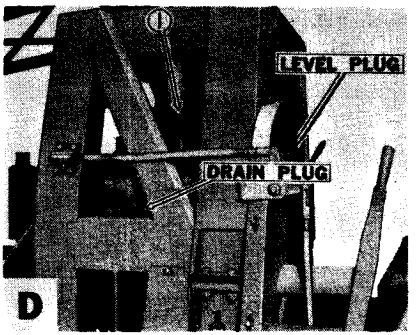
Ref. No.	Name	Lub. Hrs.
1	Mast Column Bushing...	CG—8
2	Worm Brake Plunger....	CG—8



Ref. No.	Name	Lub. Hrs.
1	Countershaft Bearing....	WB—8
2	Hoist Leg Bushing.....	CG—8



Ref. No.	Name	Lub. Hrs.
1	Sprocket Hub Bearings..	WB—8
2	Sheave Bushing.....	CG—16
3	Countershaft Bearing....	WB—8
4	Shifter Shaft Bearings... *(Two Places)*	CG—16



Ref. No.	Name	Lub. Hrs.
1	Mast Gear Housing.....	GO—1024

Every 32 hours, check level when machine is setting on level ground. Add lubricant when necessary. When draining, drain and flush immediately following operation. Capacity, 8 qts. (Approx.)

Clean Grease Fittings Before Applying Lubricant Gun

LUBRICANTS		
CG—Grease, general purpose No. 1—Above 32°F. No. 0—Below 32°F.	WB—Grease, general purpose, (Wheel Bearing and Chassis Grease No. 2)	GO—Lubricant, gear, universal SAE—90

OE or GO Lubricants Used for Extreme Temperatures—Refer to Page 38

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LUBRICATION CHART
CRANE ASSEMBLY ONLY

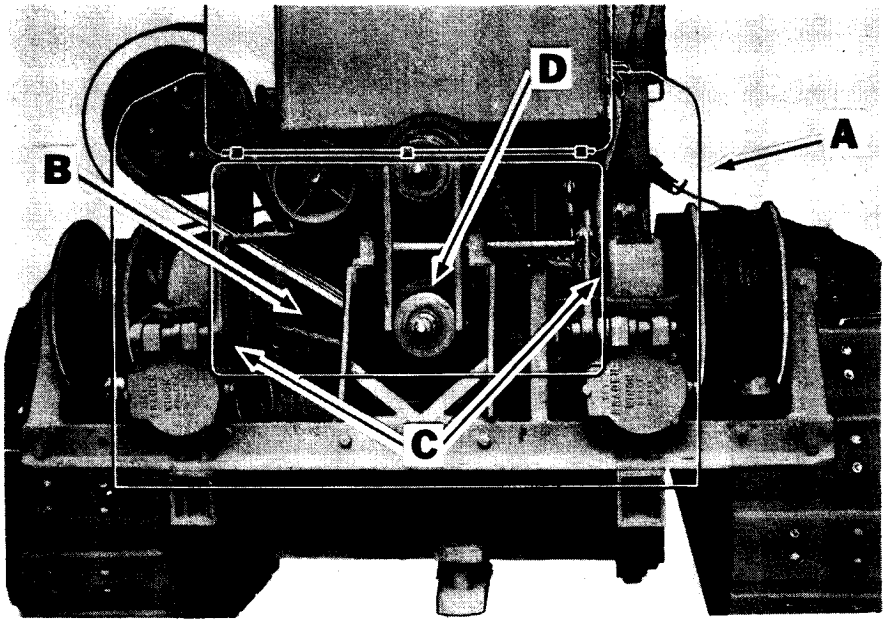
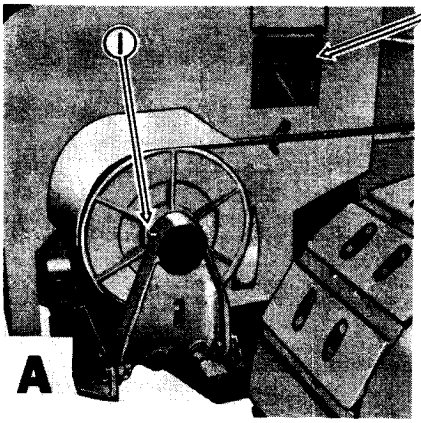
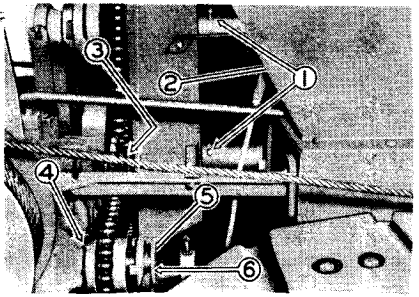


Figure 33 Points of Lubrication on Rear Drive
See close-up views below and on opposite page.



Ref. No.	Name	Lub. Hrs.
1	Hoist Leg Bushing.....	CG—8



Ref. No.	Name	Lub. Hrs.
1	Power Takeoff Bearings.. *(Two Places)*	WB—8
2	Hoist Control Bracket....	CG—16
3	Idler Sprocket Bearings..	WB—8
4	Hoist Drive Sprocket Bearing	WB—8
5	Shifter Shaft Bearing....	CG—16
6	Worm Shaft Clutch.....	OE—8

(Fork groove and sliding surface from oil can.)

Above points reached through shield opening on right side.,

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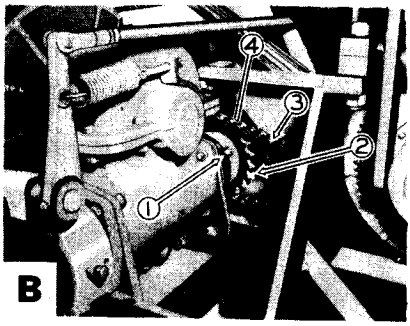
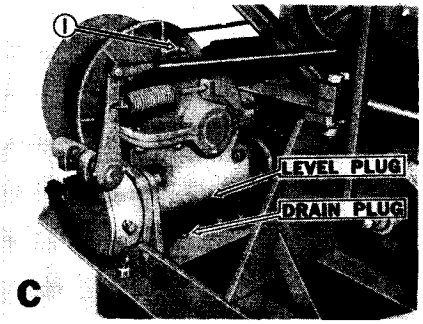
LUBRICATION CHART

CRANE ASSEMBLY ONLY



Ref. No.	Name	Lub. Hrs.
1	Hoist Drive Sprocket Bearing	WB—8
2	Shifter Shaft Bearing	CG—16
3	Hoist Drive Chain *(From oil can.)*	OE—8
4	Worm Shaft Clutch *(Fork groove and sliding surface from oil can.)*	OE—8

Apply oil to link plates rather than center of rollers. Every 1,024 hours remove chain and wash in gasoline.

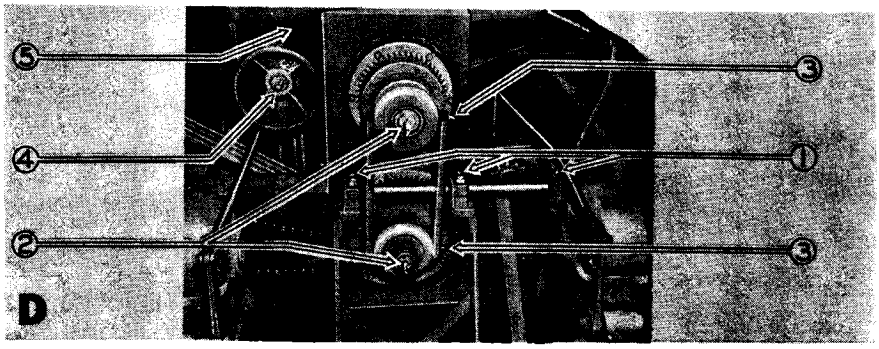


Ref. No.	Name	Lub. Hrs.
1	Hoist Worm Housing *Two Hoists—See opposite side.)*	GO—1024

Every 32 hours, check level when machine is setting on level ground. Add lubricant when necessary. When draining, drain and flush immediately following operation.

Capacity, 2 qts. (Approx.)

All points of lubrication shown on this page reached through shield rear opening.



Ref. No.	Name	Lub. Hrs.
1	Shifter Shaft Bearings *(Three Places)*	CG—16
2	Sprocket Hub Bearings *(Two Places)*	WB—8
3	Clutch Collar Bearing *(Two Places)*	WB—8
4	Idler Pulley Bearings	WB—8
5	Hoist Control Bracket	CG—16

OE or GO Lubricants Used for Extreme Temperatures—Refer to Page 38

LUBRICANTS			
CG—Grease, general purpose No. 1—Above 32°F. No. 0—Below 32° F.	WB—Grease, general purpose, (Wheel Bearing and Chassis Grease No. 2)	GO—Lubricant, gear, universal SAE—90	OE—Oil, engine SAE 30—Above 32°F. SAE 10—Below 32° F.

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LUBRICATION CHART
CRANE ASSEMBLY ONLY

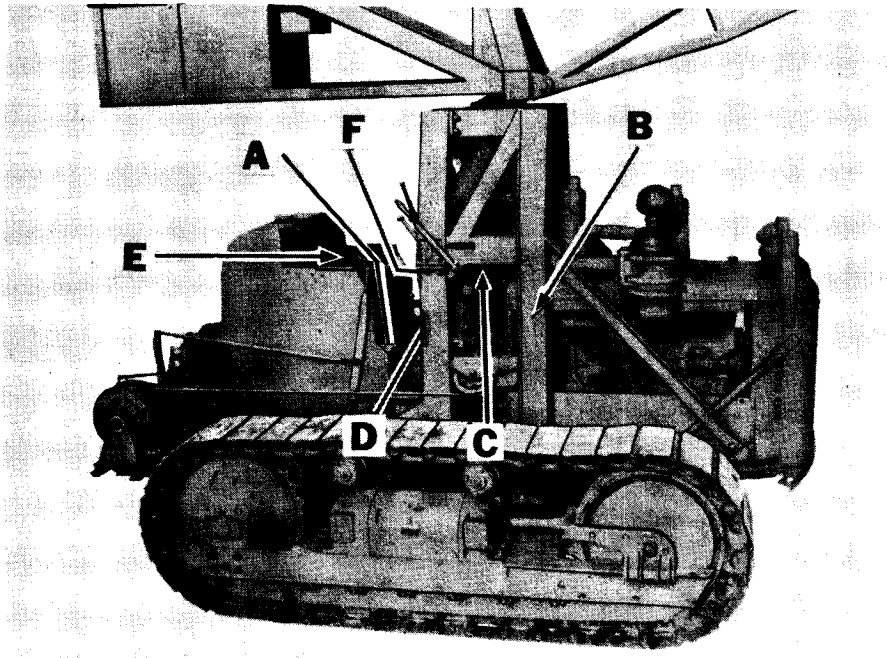
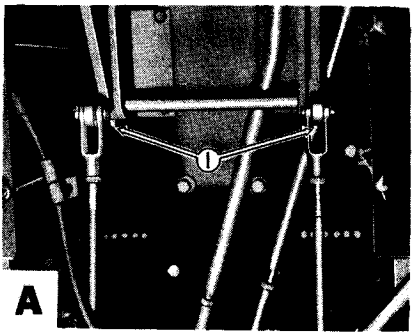
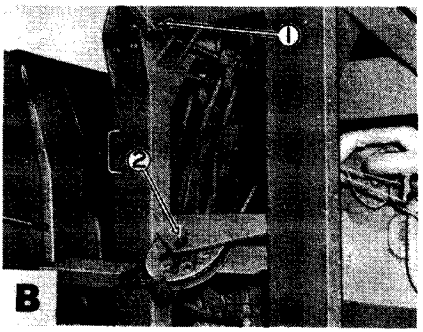


Figure 34 Points of Lubrication on Right Side

See close-up views below and on opposite page.





Ref. No.	Name	Lub. Hrs.
1	Pedal Shaft Bearings.... *(Two Places)*	CG—16

Ref. No.	Name	Lub. Hrs.
1	Lever Shaft Bearing.....	CG—64
2	Sheave Bushing.....	CG—16

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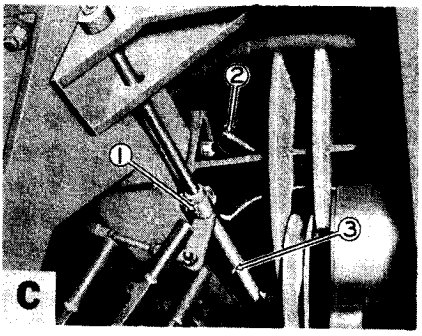
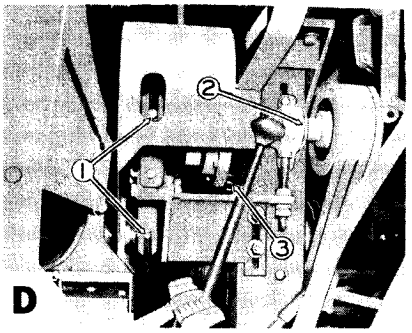
LUBRICATION CHART
CRANE ASSEMBLY ONLY

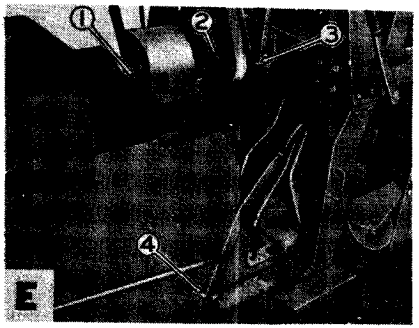


Ref. No.	Name	Lub. Hrs.
1	Lever Shaft Bearing.....	CG—64
2	Mast Column Bushing...	CG—8
3	Offset Control Lever.....	CG—16

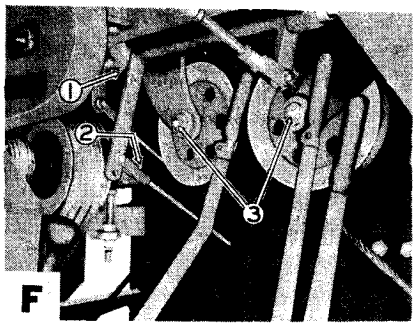


Ref. No.	Name	Lub. Hrs.
1	Clutch Collar Bearing... *(Two Places)*	WB—8
2	Reverse Shaft Bearing...	WB—8
3	Revolving Drive Chain...	OE—8

Apply oil to link plates rather than center of rollers. Every 1,024 hours remove chain and wash in gasoline.



Ref. No.	Name	Lub. Hrs.
1	Sprocket Hub Bearings..	WB—8
2	Idler Sprocket Bearings..	WB—16
3	Speed Control Lever.....	CG—16
4	Power Takeoff Control Lever	CG—16



Ref. No.	Name	Lub. Hrs.
1	Lever Shaft Bearing.....	CG—64
2	Reverse Shaft Bearing...	WB—8
3	Sheave Bushing..... *(Two Places)*	CG—16

Clean Grease Fittings Before Applying Lubricant Gun

LUBRICANTS		
CG—Grease, general purpose No. 1—Above 32°F. No. 0—Below 32°F.	WB—Grease, general purpose, (Wheel Bearing and Chassis Grease No. 2)	OE—Oil, engine SAE 30—Above 32°F. SAE 10—Below 32°F.

OE or GO Lubricants Used for Extreme Temperatures—Refer to Page 38

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LUBRICATION CHART
CRANE ASSEMBLY ONLY

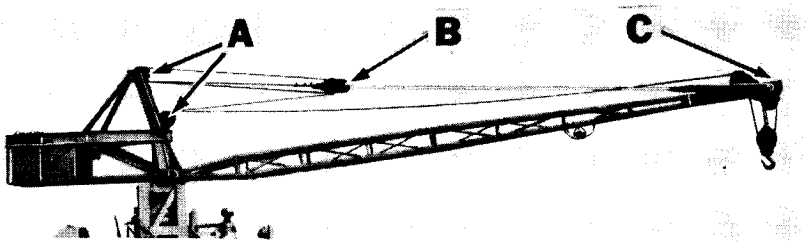
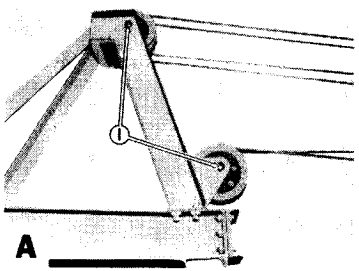
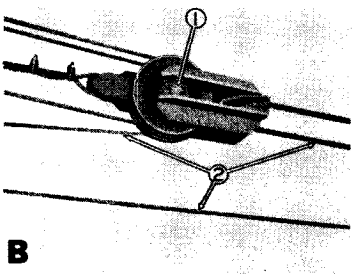


Figure 35. Points of Lubrication for Boom and Sheaves

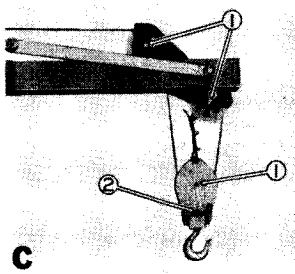
See close-up views below.



Ref. No.	Name	Lub. Hrs.
1	Sheave Bushings..... *(Two Places)*	CG—16



Ref. No.	Name	Lub. Hrs.
1	Sheave Bushings.....	CG—16
2	Cables ..... Keep all cables lubricated with CW.	



Ref. No.	Name	Lub. Hrs.
1	Sheave Bushing..... *(Three Places)*	CG—16
2	Swivel Hook Bearing....	WB—16

GENERAL INSTRUCTIONS

Every 64 hours, lubricate yoke pins on all control links with OE. Every 128 hours, lubricate friction clutch toggle pins and rollers with OE.

LUBRICANTS
CG—Grease, general purpose No. 1—Above 32°F. No. 0—Below 32°F.
CW—Oil, lubricating, chain and wire rope, grade 2
WB—Grease, general purpose, (Wheel Bearing and Chassis Grease No. 2)
OE—Oil, engine SAE 30—Above 32°F. SAE 10—Below 32°F.

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OPERATING INSTRUCTIONS

Instruction plates are placed near the position of all controls. Information on the plates shows shift positions and describes the portion of the crane that each control device operates. See instructions on the following pages.

The lifting capacity of the boom is dependent upon two conditions. A frame or compartment for 4,000 pounds of counterweights is arranged opposite the boom to balance or offset loads on the hook. Considerable more load can be lifted with the counterweights in place than without counterweights.

Observe the lifting capacity of the crane shown in Figure 36. Notice the weights of load the machine will handle at varying distances from the center of the mast column. The diagram specifies the amount of load that can safely be lifted at 12, 18, 24 and 30 feet from the center of the mast.

An instruction plate showing the lifting capacity is also attached to the upper frame member that is located directly in front of the operator.

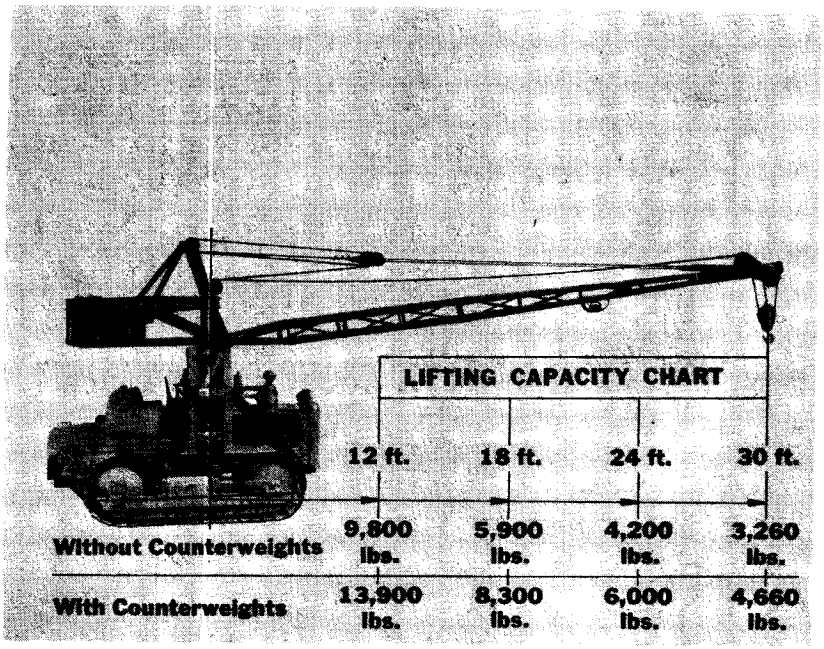


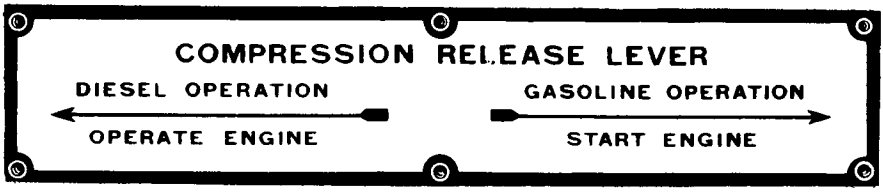
Figure 36 Crane Lifting Capacity

OPERATING INSTRUCTIONS

Figure 37 Crane Controls

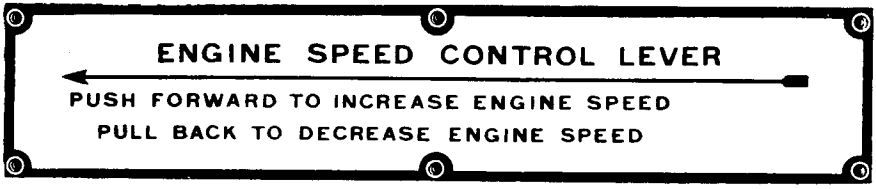
13600-A

OPERATING INSTRUCTIONS



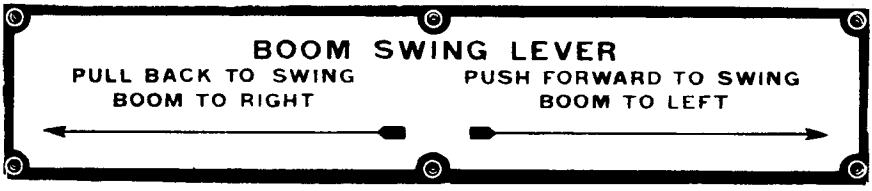
COMPRESSION RELEASE LEVER

Push the lever forward for starting the tractor engine. Allow the engine to operate approximately one minute, or two or three minutes in cold weather, as specified by the International Harvester Company. Pull the lever back to change from gasoline to Diesel fuel. Push the ENGINE SPEED CONTROL LEVER forward as the change is made from gasoline to Diesel fuel. NOTE: Change back to gasoline before stopping the engine. This will aid the next starting operation. Refer to "Operating the Diesel Engine" in the maintenance manual for the tractor.



ENGINE SPEED CONTROL LEVER

Push lever forward to increase the engine speed or pull lever back to decrease speed or stop engine.



BOOM SWING LEVER

Push the lever forward to rotate the boom to the left or pull the lever back to rotate the boom to the right. Placing the lever beyond neutral in either position releases the worm shaft brake. If the boom fails to stop rotating when the lever is shifted to neutral, the mast worm brake or brake control links need to be adjusted. Another reason for the boom to continue in rotation might be due to the improper adjustment of friction clutches on the primary countershaft or reverse countershaft. If clutch plates stick or the adjustment is extremely tight, the boom will have a tendency to continue in motion. Refer to Adjustment Instructions, "Mast Worm Shaft Brake" and "Friction Clutches." If the boom fails to rotate, the friction clutch plates may be loose and the clutches need to be adjusted. Similar trouble is experienced if the bolt tension on the mast ring gear is loose and allows the gear to slip. Refer to the Adjustment Instructions, "Mast Gears."

SEE SAFETY PRECAUTIONS PAGE 52

OPERATING INSTRUCTIONS

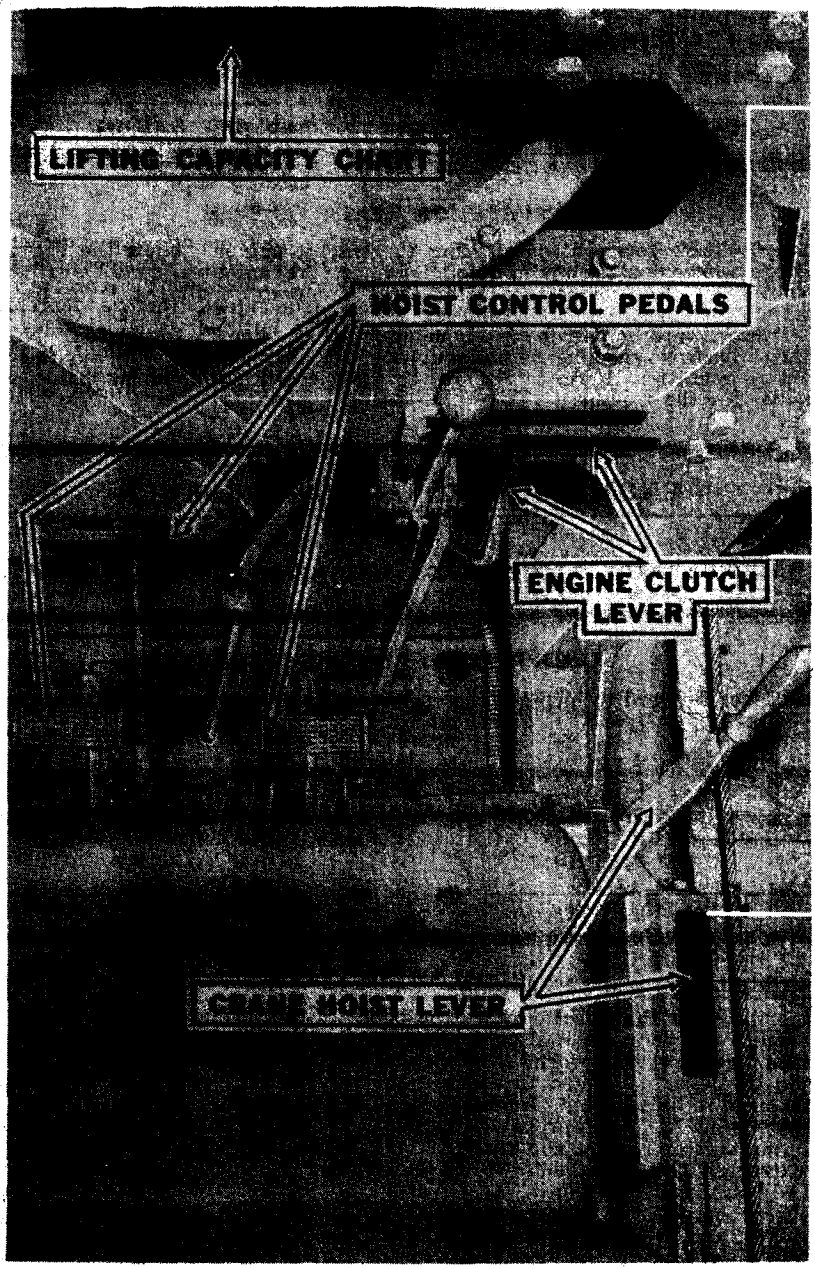
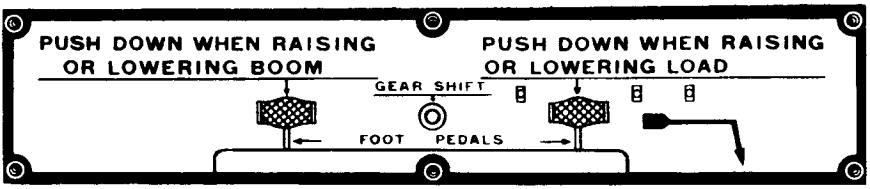


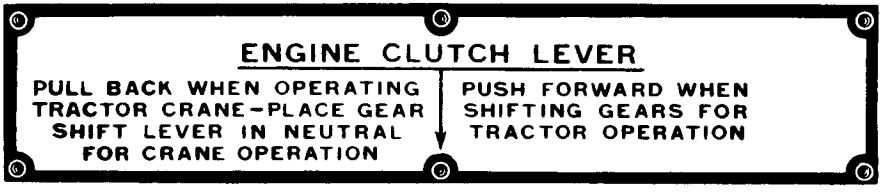
Figure 38 Crane Controls

OPERATING INSTRUCTIONS



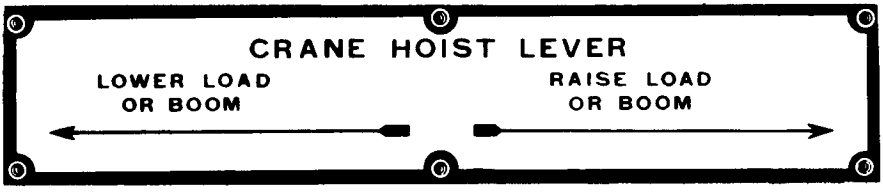
HOIST CONTROL PEDALS

Preliminary to raising or lowering the boom or load, engage jaw clutches on hoist worm shafts. Place the CRANE HOIST LEVER in neutral position, then engage hoist jaw clutches by depressing either or both pedals. Always move the crane hoist lever to neutral and pause momentarily before depressing either pedal. This protects the clutch jaws. The left foot pedal elevates and lowers the boom after the crane hoist lever is engaged. The right foot pedal elevates and lowers the load after the crane hoist lever is engaged. If jaw clutches on the hoist worm shaft do not engage, refer to Adjustment Instructions, "Hoist Worm Shaft Clutch."



ENGINE CLUTCH LEVER

No portion of the crane assembly is driven until the ENGINE CLUTCH LEVER is moved to its rear position. Observe directions on the instruction plate regarding the traveling motion of the tractor. If there is an immediate need to discontinue the operation of the crane move this lever forward to neutral position.



CRANE HOIST LEVER

(As Read from Operator's Seat)

Depress either or both HOIST CONTROL PEDALS while the CRANE HOIST LEVER is in neutral position. Move the lever to its rear position to raise the boom or load. Place it in its forward position to lower the boom or load. Failure to raise or lower the boom or load upon shifting this lever usually indicates that jaw clutches on the hoist worm shafts are not engaged. The same condition might exist if the power take-off clutches are loosely adjusted. Refer to Adjustment Instructions, "Hoist Worm Shaft Clutch" and "Friction Clutches." If the power take-off clutches are adjusted tightly the boom may have a tendency to continue to raise or lower after the control lever is placed in neutral position.

SEE SAFETY PRECAUTIONS PAGE 52

SAFETY PRECAUTIONS

Do not attempt to pick up loads in excess of those specified on the lifting capacity diagram. Operate at moderate engine speeds until familiar with controls.

Move the machine into position on as level ground as possible before operating the crane. A rapid pickup and swinging motion of the load could overturn the tractor if the tractor is sitting in a tilted position.

Do not pass the boom over the operator's seat. This will twist the cables within the mast column. Twisting the cables may pull them from the sheave grooves or damage them.

Be sure the boom reacts to the operation of the hoist control lever located to the right of the operator's seat. Twisted lines, or some other cause that prevents the lines from traveling, may suddenly slip and drop the boom or load.

Watch the boom as it is elevated. Do not pull cable clamps into the sheave grooves in the upper frame.

Inspect cables daily. Replace them if they are kinked or show evidence of the wire strands being broken.

Check the locking device on the sheave pins daily. Make certain that the pins are firmly locked.

Keep shields in their position over all drive belts or drive chains. Allow no one to climb on the tractor while it is in motion.

Refer to the adjustment instructions and determine that all parts are properly adjusted daily. Disengage tractor engine clutch lever before making any adjustment.

Do not tighten mast ring gear beyond the specified setting given in the adjustment instructions.

Periodically check the tension and tighten all bolts or nuts used to assemble the entire crane attachment.

Be sure that the machine is lubricated at intervals specified in the lubrication instructions.

ADJUSTMENT INSTRUCTIONS

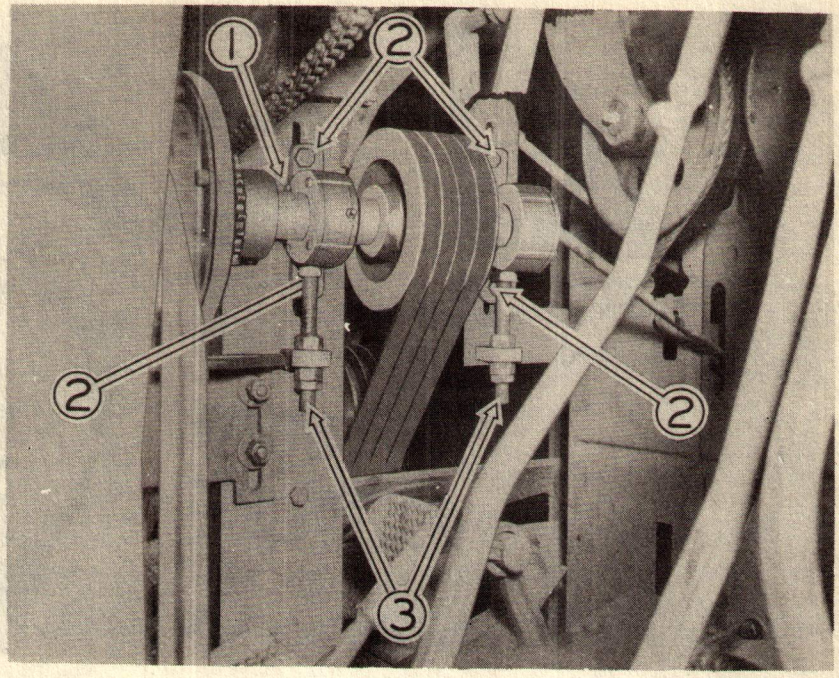


Figure 39 Countershaft Drive Belts

DRIVE BELTS

If drive belts slip they need tightening. Keep the belts free from oil and do not use belt dressing. Check the belt tension and alignment at regular intervals. Do not allow belts to run loosely thereby causing unnecessary wear.

Countershaft Drive Belts

The reverse countershaft (1), Figure 39, mounted on the main frame may be shifted higher or lower to establish proper belt tension. To adjust the belts, loosen the nuts on the four capscrews (2) that anchor the bearing cases. Loosen the nuts on the adjustment bolts (3) enough to permit a change of the bolt setting. Tighten the belts by turning the adjustment bolts (3) against the shaft bearing cases. Make certain the drive shafts are parallel and that the pulleys are correctly aligned. Tighten the belts until they are fairly snug. Then reset the nuts on the adjustment bolts and capscrews holding the bearing cases.

ADJUSTMENT INSTRUCTIONS

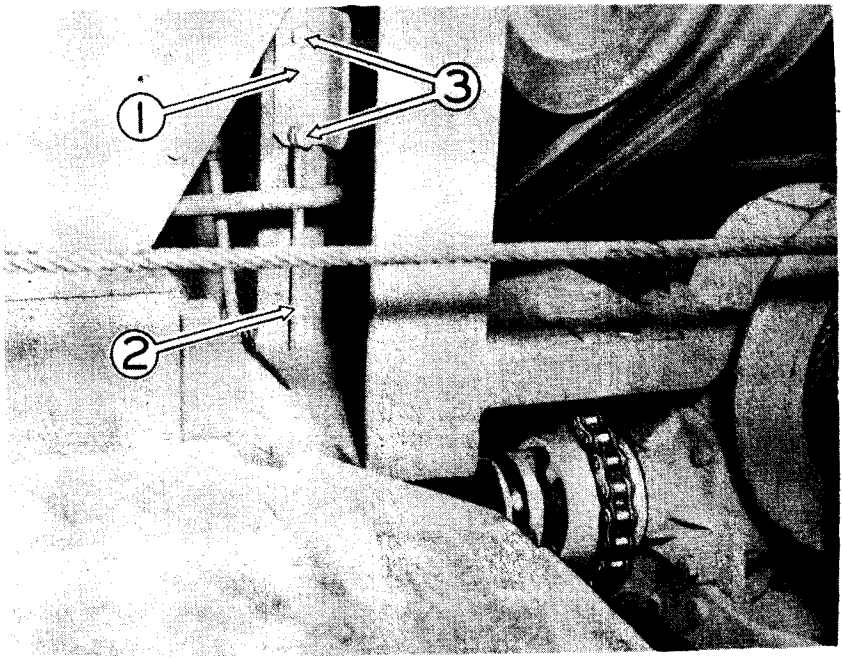


Figure 40 Power Take-Off Belt Idler

Power Take-Off Belts

The tension of the power take-off belts is adjusted by shifting the position of an idler pulley on its mounting bracket (1), Figure 40. The adjustment bolt (2) in connection with the pulley mounting provides a convenient method of tightening the belts. Loosen capscrews (3) and set the position of the idler. Allow a slight tension on the belts between the pulley and the two opposite driving sheaves. Reset the nuts on the adjustment bolt and capscrews that hold the idler bracket.

DRIVE CHAINS

Two roller drive chains are installed. The mast drive chain or the hoist drive chain may be adjusted to the proper tension by an idler sprocket mounted within the slack span of the drive. The usual

ADJUSTMENT INSTRUCTIONS

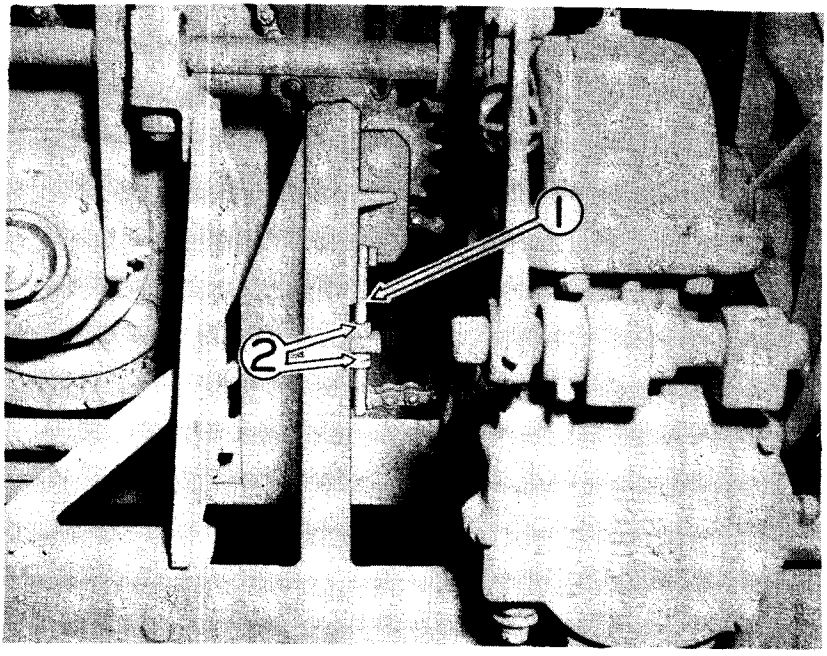


Figure 41 Hoist Drive Chain Idler

method of shifting the idler sprocket accomplishes adjustment.

Abnormal wear on the sprockets and chain will result in misalignment. Keep shafts parallel and the sprockets in line. Check for proper alignment with a strong cord or straight-edge placed across the span of the drive and against the side of the sprockets. Proper tension should allow only a slight movement of the chain at the mid-span by normal hand pressure. Remove the chains and clean them in gasoline occasionally. The chain cannot be lubricated if the rollers are filled with grit and dirt. Refer to the lubrication instructions.

Hoist Drive Chain

The tension on the roller link chain which drives the hoists is

ADJUSTMENT INSTRUCTIONS

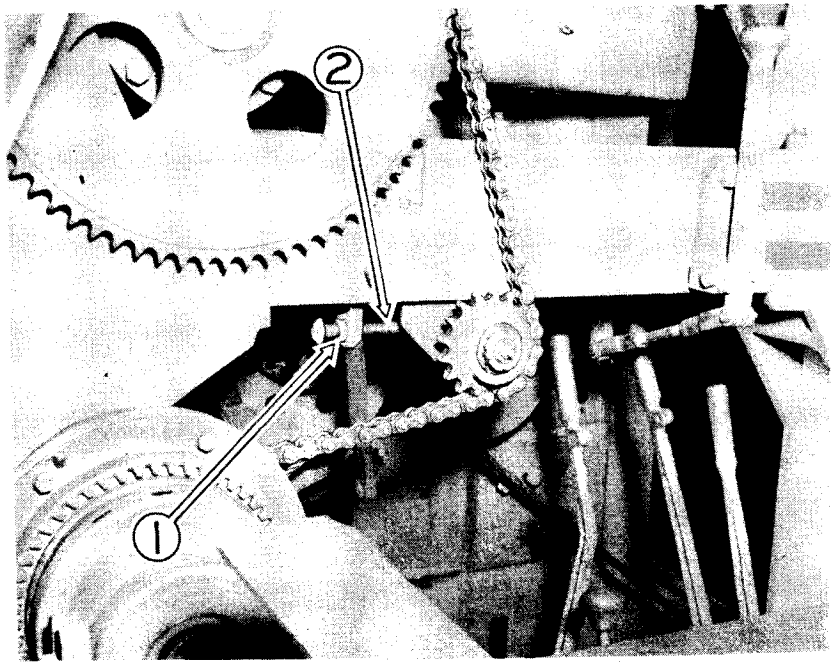


Figure 42 Revolving Drive Chain Idler

adjustable by the bolt (1), Figure 41. Loosen the nuts on capscrews placed through the sprocket mounting bracket. Raise or lower the sprocket to the desired adjustment by turning and resetting nuts (2).

Revolving Drive Chain

Figure 42 illustrates the mast gear or revolving drive chain after the shield has been removed. It is not necessary to remove the shield to tighten the drive chain. Loosen the locknut (1) and turn the adjustment bolt (2) to place the sprocket in a desirable position. Reset the locknut (1).

ADJUSTMENT INSTRUCTIONS

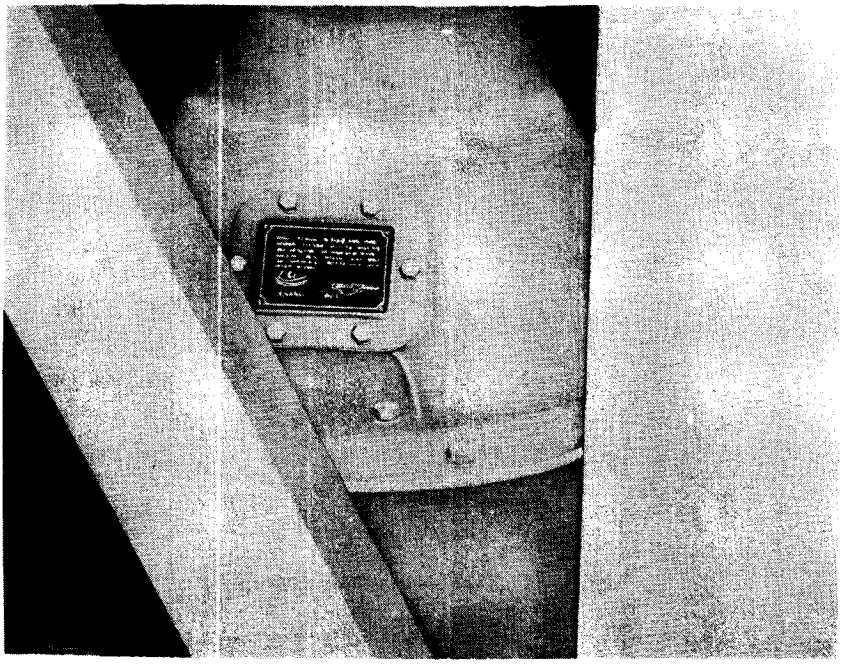


Figure 43 Instruction Plate

MAST GEARS

The design of the mast gear mechanism protects the gears against damage when the gears are subjected to shock loads. A clamp ring securely tightened against the ring gear allows the gear to slip only slightly when a shock load is encountered.

Adjustment Instruction Plate

Refer to Figure 43 showing the position of an instruction plate. The plate is mounted on the gear housing inspection hole cover and it describes the procedure of tightening capscrews that hold the gear in place. The clamping force is regulated by applying 1,600 inch pounds torque or twisting force evenly distributed on the capscrews around the column flange.

ADJUSTMENT INSTRUCTIONS

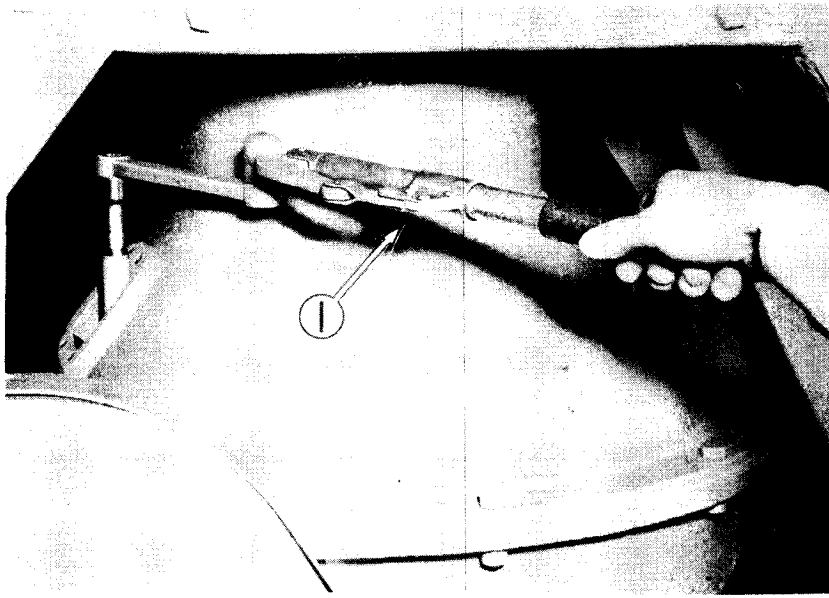


Figure 44 Tightening Gear Clamp

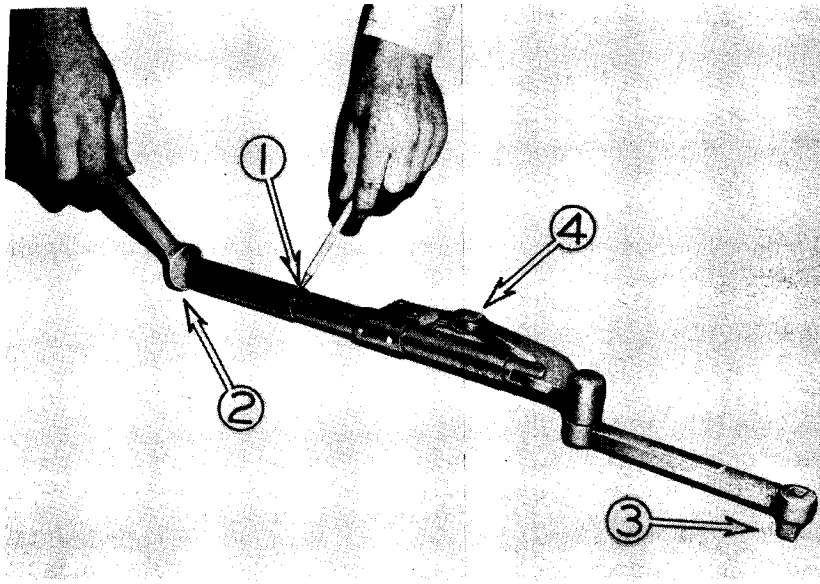


Figure 45 Setting Tension Wrench

ADJUSTMENT INSTRUCTIONS

Setting Tension Wrench

Refer to Figure 44 showing a special wrench (1) including a wrench extension which is furnished with the tool equipment. Use the special wrench and extension for setting the capscrews to the proper tension. Refer to Figure 45 at the point indicated (1). Set the wrench on number 10 of the graduated scale which is stamped on the barrel, even with the upper end of the sleeve. The proper setting of the wrench is made by turning the hexagon nut (2) at the end of the handle.

Tightening Gear Clamp

Insert the square drive pin (3), Figure 45, into the socket wrench and extension bar. Tighten the capscrews until the wrench toggle (4) snaps over center toward the body of the wrench. Continue the process for each capscrew around the column flange and all capscrews will have the same tension.

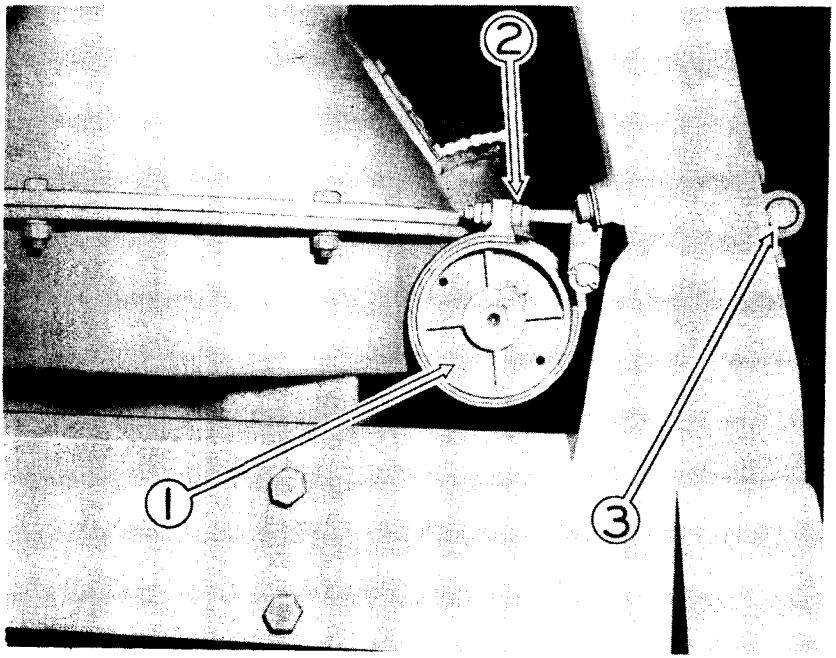


Figure 46 Mast Worm Shaft Brake

ADJUSTMENT INSTRUCTIONS

Mast Worm Shaft Brake

The gear mechanism that revolves the mast is equipped with an automatic brake. When the boom lever which controls the revolving drive clutches is moved to neutral position, the brake immediately checks the rotation of the boom. The brake releases when the position of the boom swing lever is shifted to engage either friction clutch.

Adjusting Brake

Observe Figure 46. The linkage to plunger (3) should release the brake when the boom swing control lever is pushed forward or pulled toward the operator. Check the position of the yoke ends on the control links to determine that the plunger releases the brake upon clutch engagement. The brake band should allow only enough clearance to permit the flange (1) to turn freely when the brake is released. To adjust the band, loosen and reset the jam nuts on the adjustment bolt (2) allowing approximately 1/32" clearance between the flange and brake lining when the brake is released.

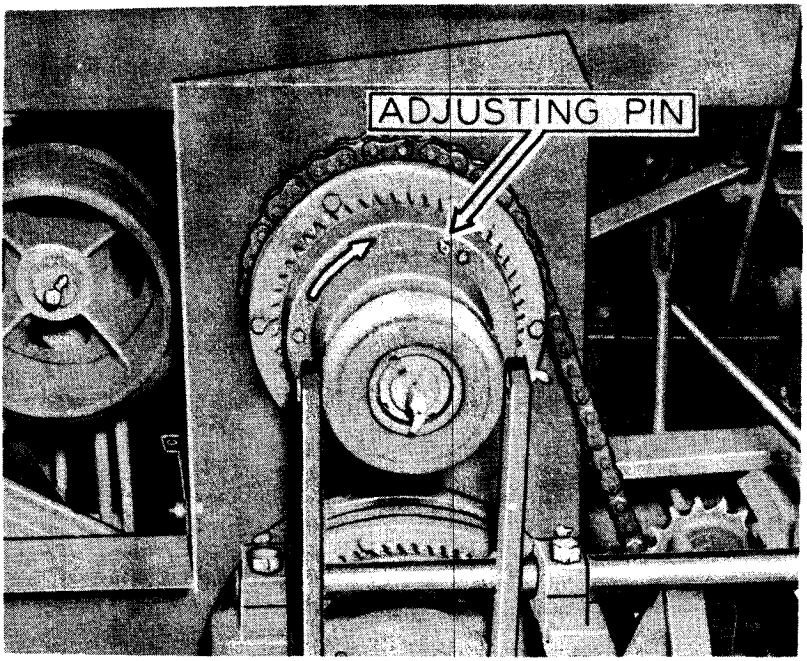


Figure 47 Adjusting Friction Clutch

ADJUSTMENT INSTRUCTIONS

FRICTION CLUTCHES

The machine is equipped with four friction clutches. The clutches are different sizes but the adjustment of any of the four is accomplished in the same manner. If any one of the four friction clutches does not pull or if it heats or jumps out of engagement, the clutch must be adjusted. A new clutch requires several adjustments until the friction discs are worn in.

Adjusting Friction Clutch

To adjust the clutch pull the adjusting pin out and lock it in the outward position. Refer to Figure 47. Lock the pin in its outward position by inserting a wire, cotter key or similar item through the drilled hole of the adjusting pin. Turn the adjusting ring to the right or clockwise, as indicated in the illustration, until the operating lever requires a distinct pressure to engage. Release the adjusting pin. Allow the pin to reset in a drilled socket of the clutch back plate.

HOIST CONTROLS

Hoist worm shaft clutches and brakes are operated by two pedals that are located centrally below the operator's seat. Since the hoist clutch and brake are located on opposite ends of each hoist worm shaft, one control operates both devices. All link connections must be set at a position to shift the clutch and release the brake at the same time. Complete adjustment of this control cannot be made without checking and setting the adjustments of the yoke end connection on each of the three links operated by either control pedal.

Worm Shaft Clutch and Brake Control

The release of the hoist safety brake and the engagement of the hoist jaw clutch on the worm shaft is accomplished in a single operation. Links from the control pedals must have the yoke end connection set at a position which permits this function.

Hoist Worm Shaft Brake

A safety brake on the hoist worm shaft checks any tendency for the hoist drum to rotate backward under load. When the links from either pedal control are properly adjusted the brakes are automatically released upon depressing the pedals. In the same operation the clutches located on the opposite ends of the worm shafts are engaged.

ADJUSTMENT INSTRUCTIONS

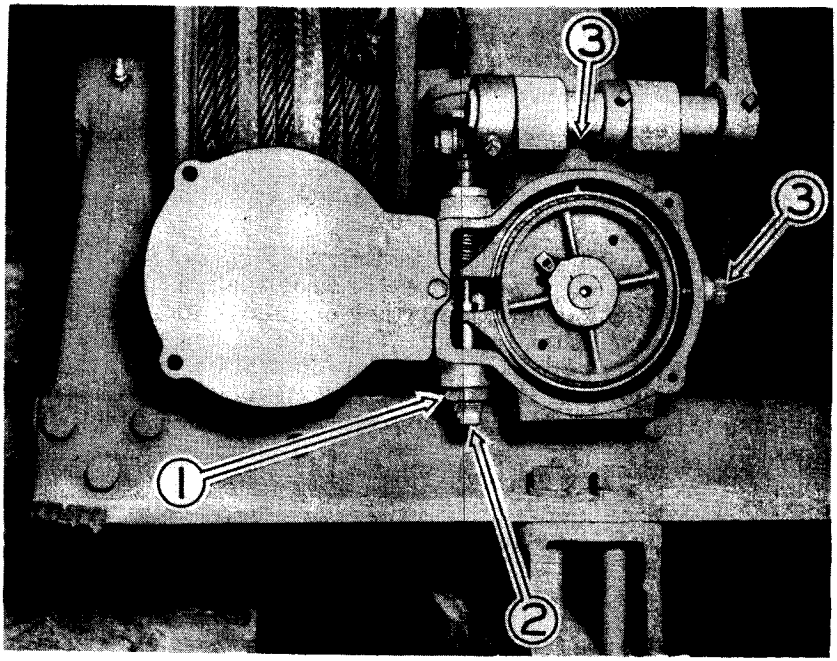


Figure 48 Hoist Worm Shaft Brake

Adjusting Hoist Brake

To adjust the brake, remove the housing cover as shown in Figure 48. Loosen jam nut (1) on the brake band anchor bolt. Give the adjusting screw (2) one-half turn to the right for tightening or to the left for loosening. Then reset the jam nut (1). Set adjustment bolt (3) to provide equal spacing between the brake lining and the pulley flange.

Brake Control Links

If links (1), Figure 49, from either foot pedal control should be disconnected, upon reassembly it is important that the position of the yoke end connections permits application of the worm shaft brake. Compression springs within the brake housings as well as springs (2) automatically apply the brakes until control pedals are depressed. The brakes are released when the jaw clutches on the worm shafts are engaged. Set the adjustment bolts connected to

ADJUSTMENT INSTRUCTIONS

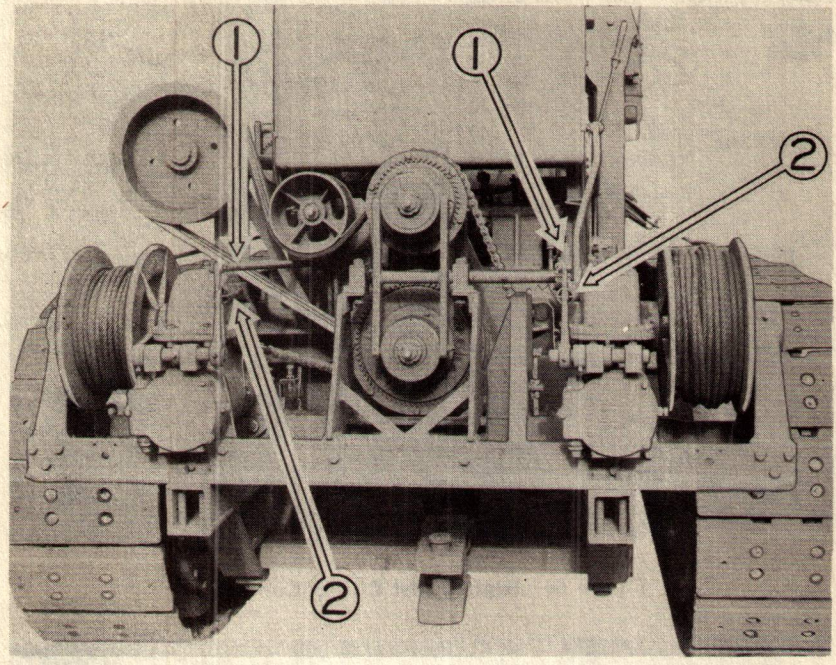


Figure 49 Dual Hoist and Controls

the springs (2) to a degree of tension that returns the foot pedals to their topmost position.

Hoist Worm Shaft Clutch

When the links to the worm shaft brake have been connected and adjusted properly, check the position of the connecting yokes on links (1), Figures 50 and 51. Adjust the links so the jaw clutch sliding members move to full engagement when pressing the control pedals. Set and lock nuts on the adjustment bolts (2), Figures 50 and 51, so the clutch members are held within 1/16″ of complete engagement of the jaws. This adjustment is important as it protects the clutch shift forks from excessive wear when the operator holds the clutch in engagement.

ADJUSTMENT INSTRUCTIONS

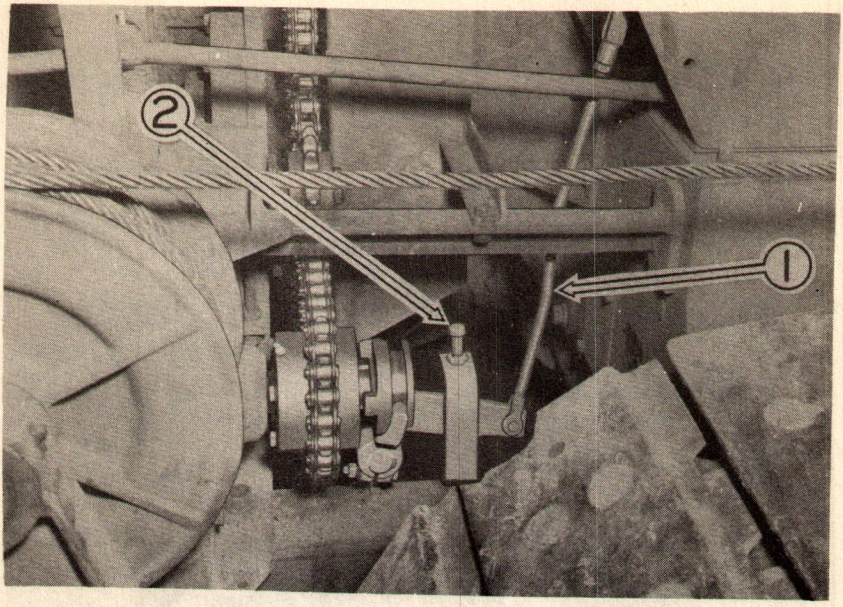


Figure 50 Right Hoist Clutch Control

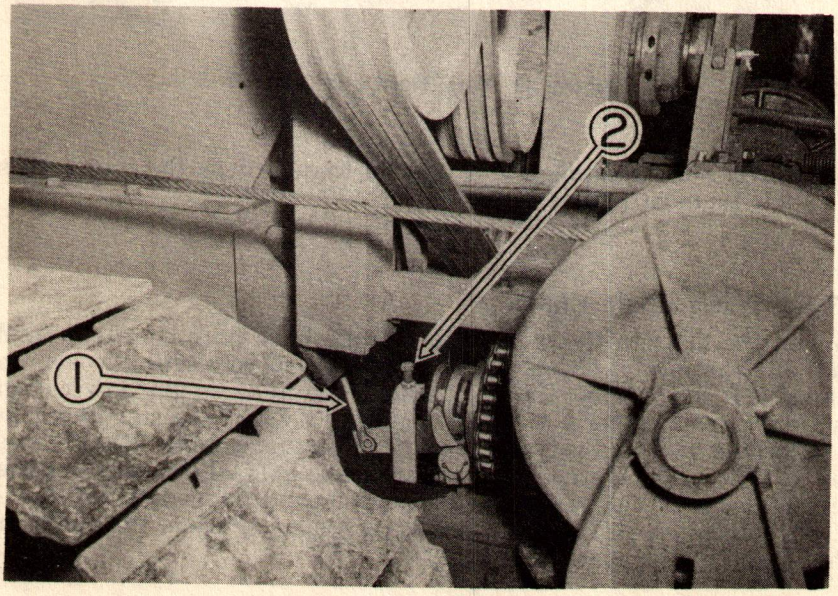


Figure 51 Left Hoist Clutch Control

REPAIR SECTION

– For –

MODEL CTD REVOLVING CRANE

Prepared for Mounting on

INTERNATIONAL HARVESTER COMPANY

Model TD-18 TracTracTor

FOREWORD

It has been attempted in the following pages and illustrations to show the logical steps required in dismantling the machine for repairing. In preparing this Repair Section we have kept in mind that many repairs might have to be made in the field or on the job and with this in mind we have shown the removal of parts with hand tools.

If more modern facilities are available it should be noted that many operations could be made more easily–in particular, by using a press.

It is strongly recommended that all parts be thoroughly cleaned before reassembling. It is also recommended that new oil seals be installed in reassembling.

(See Index on following page)

INDEX

MACHINE REPAIR

HOIST

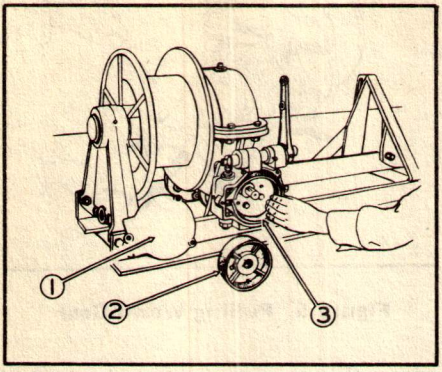


Figure 1 Removing Brake Band

HOIST BRAKE

Each hoist has a safety brake on the hoist worm shaft which checks any tendency for the drum to rotate backward under load. This brake is automatically released upon engaging the jaw clutch located on the opposite end of the worm shaft.

REPLACEMENT OF BRAKE BAND

Remove cover (1), Figure 1. Pull off brake drum (2) and remove brake band (3). After a new band is installed, do not replace the cover until the brake has been adjusted as described in the "Operations Section," Page 62.

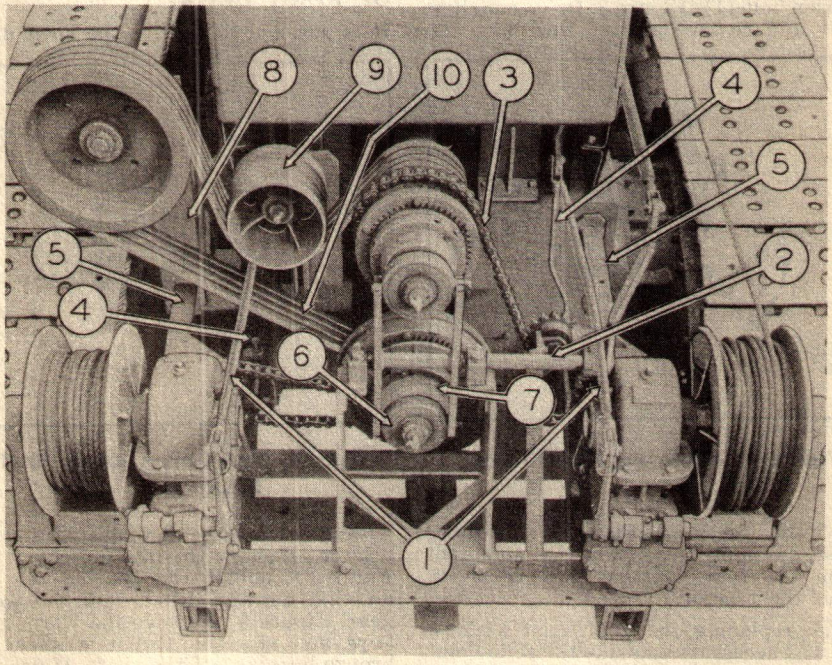


Figure 2 Power Take-Off and Dual Hoist Assembly

13687-A

HOIST

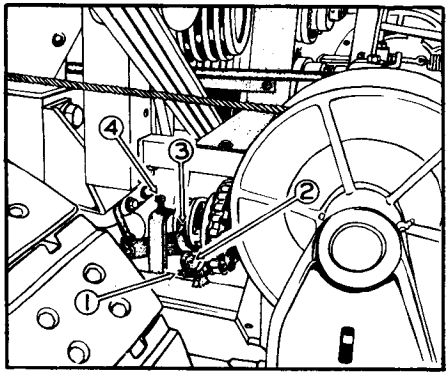


Figure 3 Hoist Jaw Clutch Control

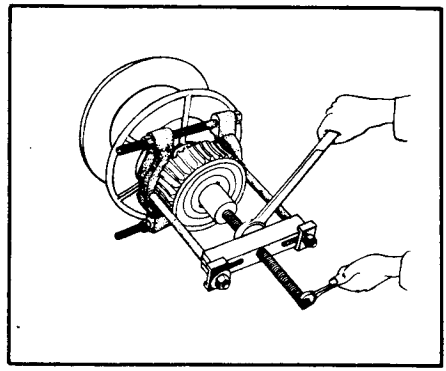


Figure 5 Pulling Worm Gear

DUAL HOIST ASSEMBLY

Remove the rear shield, lower the boom, and remove the cables from both hoist drums. Remove the hoist brake control links (1), Figure 2, friction clutch shifter (2), chain and belt shield, drive chain (3), jaw clutch control links (4), and loosen bolt (1), Figure 3. Drive out shaft (2) and remove shifter fork (3). Remove the braces (5), Figure 2. The dual hoist assembly may now be unbolted from the rear supports and removed from the tractor.

When replacing the dual hoist assembly it is necessary to make the following adjustment on the jaw clutch shifter forks. With the jaw clutch engaged, the adjustment bolt (4), Figure 3, should be set so that the jaw clutch lacks $\frac{1}{16}$" of being completely engaged. This is necessary to prevent excessive wear of the shifter fork and groove.

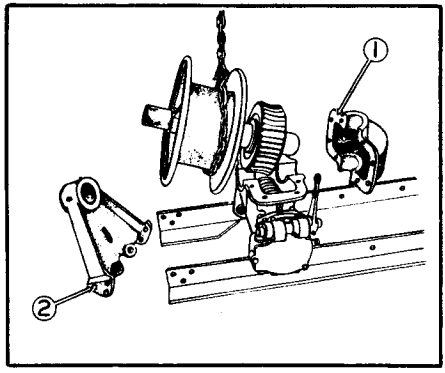


Figure 4 Removing Hoist Drum

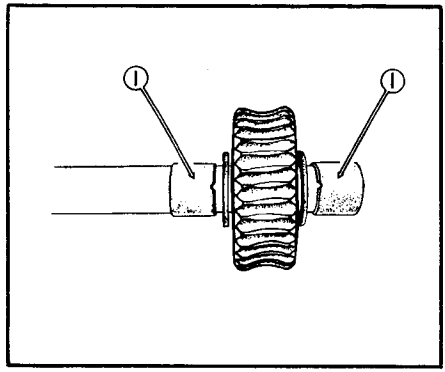


Figure 6 Assembly of Drum Shaft Bushings

REMOVAL AND DISASSEMBLY OF HOIST DRUM

It is possible to remove the hoist drum without removing the hoist from the tractor. Remove the housing cover (1), Figure 4, unbolt the bearing leg (2) and lift out the drum. Pull the worm gear, Figure 5. Remove the worm gear keys and slip the thrust washer and bronze bushing off the shaft. If desired, the shaft may now be driven out of the drum.

HOIST

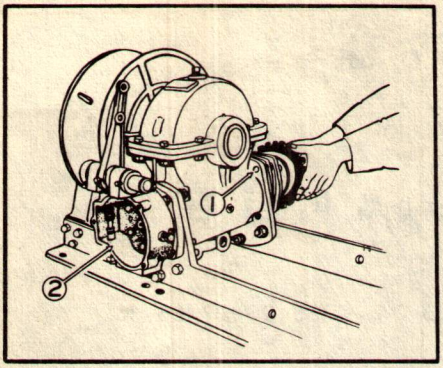


Figure 7 Removing Hoist Worm Shaft

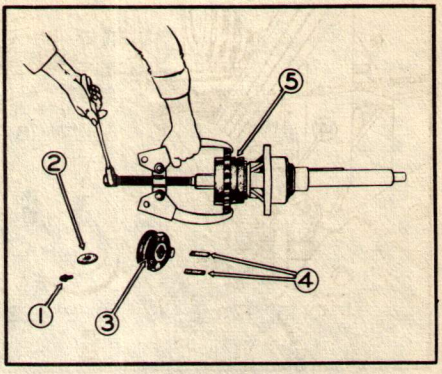


Figure 9 Pulling Drive Sprocket

When reassembling the drum shaft, the bushings (1), Figure 6, must be installed with the oil groove as shown in order to provide proper lubrication of the bushings. If new bushings are installed, they must be drilled for dowel pins. Before replacing cover (1), Figure 4, remove the two dowel pins. After the cover is in place, drill into the bushings

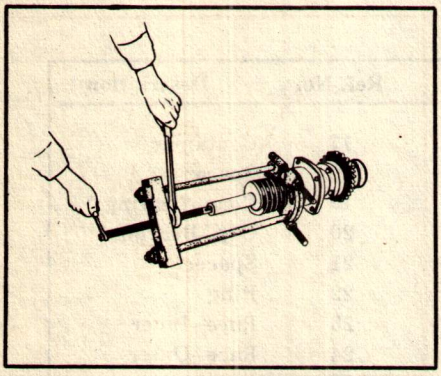


Figure 8 Pulling Hoist Worm

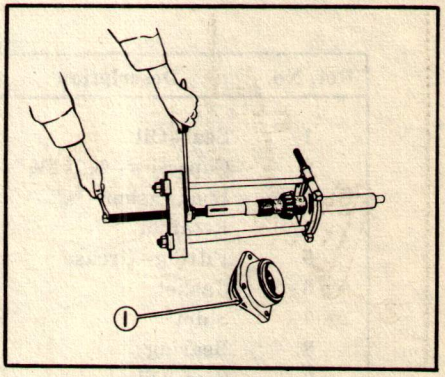


Figure 10 Pulling Bearing

1/16" to 1/8" deep using a No. 14 (.182 dia.) drill. Take care not to drill through the bushings. Then drive in new dowel pins.

REMOVAL AND DISASSEMBLY OF WORM SHAFT

If the worm shaft is to be removed from the hoist, the hoist must be removed from the tractor. Remove the cover (1), Figure 1, from the hoist brake, pull off the brake drum (2), remove brake band (3), and the bolts (1), Figure 7, holding the bearing container. The worm shaft may now be removed as shown in Figure 7 by rotating the shaft so that the worm is screwed out of engagement with the worm gear. It is not necessary to have the hoist drum removed for this operation.

Pull the worm from the shaft, Figure 8. Remove capscrew (1), Figure 9, retaining washer (2), clutch (3), keys (4), and pull the sprocket assembly (5). The bearing container (1), Figure 10, may now be slipped off the shaft. The

HOIST WORM SHAFT

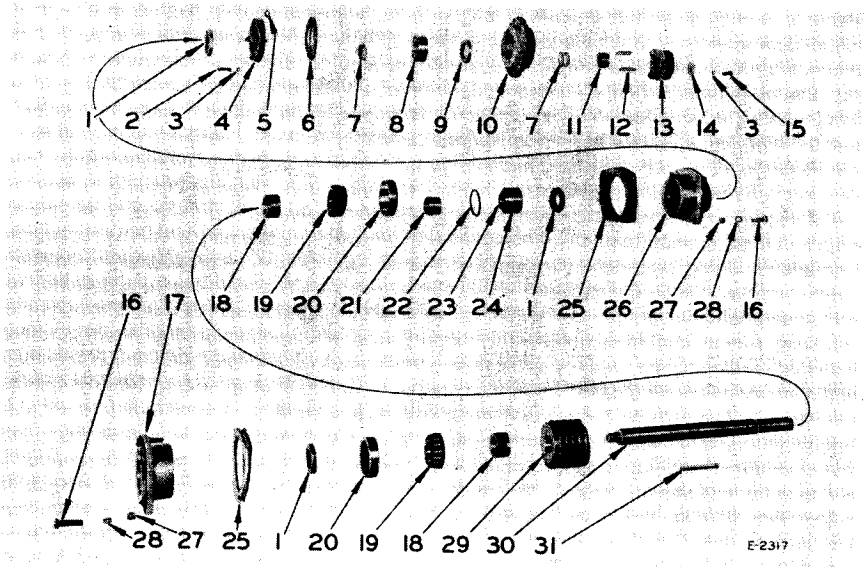


Figure 11 Hoist Worm Shaft

Ref. No.	Description	Ref. No.	Description
1	Seal–Oil	17	Container
2	Capscrew–⅜"x1½"	18	Spacer
3	Lockwasher–⅜"	19	Cone–Bearing
4	Retainer	20	Cup–Bearing
5	Fitting–Grease	21	Spacer
6	Gasket	22	Ring
7	Shim	23	Race–Inner
8	Bearing	24	Race–Outer
9	Seal–Oil	25	Gasket
10	Sprocket	26	Container
11	Spacer	27	Nut–½"
12	Key–Clutch	28	Lockwasher–½"
13	Clutch	29	Worm
14	Washer	30	Shaft
15	Capscrew–⅜"x1¼"	31	Key–Worm
16	Capscrew–½"x2"		

HOIST

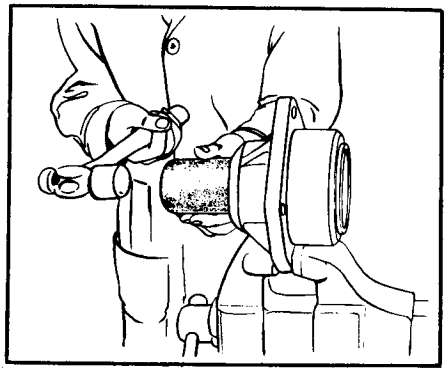


Figure 12 Removing Oil Seal and Outer Bearing Race

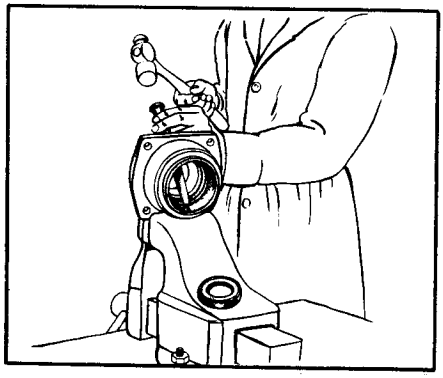


Figure 14 Removing Bearing Cup

remaining parts may be pulled off as shown in Figure 10.

If the outer bearing race (24) or oil seal (1), Figure 11, is to be removed, first remove snap ring (22) and drive against oil seal (1) as shown in Figure 12.

To disassemble the sprocket assembly, unbolt and remove bearing retainer (4) bolts from the bearing container (17), Figure 11, and remove from the hoist. Remove the oil seal (1) from the bearing container. Bearing cup (20) may be removed from the bearing container (17) as shown in Figure 14.

ASSEMBLY OF WORM SHAFT

Place key (31) into keyway of shaft

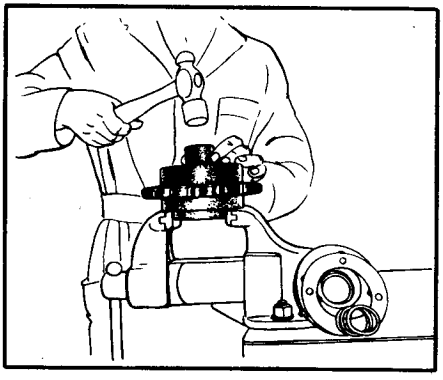


Figure 13 Removing Bearing

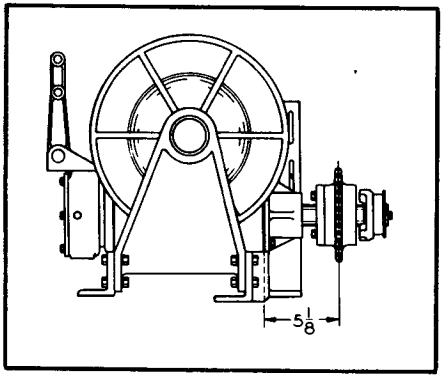


Figure 15 Hoist Sprocket Alignment

Figure 11. The oil seal (1) may now be removed from the bearing retainer. To remove bearing (8) drive against the inner race as shown in Figure 13. Oil seal (9), Figure 11, may now be removed from the sprocket.

To remove oil seal (1) and bearing cup (20), Figure 11, unbolt and remove brake housing (2), Figure 7. Remove (30), Figure 11, and press worm (29) on shaft. Place the two spacers (18) on the shaft so that notches fit over the key (31). Install roller bearing cones (19). Slip spacer (21) on the shaft and press on the inner bearing race (23). Install oil seal (1) into the bearing container (26) with the lip turned inward. Assemble the outer bearing race (24), snap ring (22) and bearing cup

(Continued on Page 7)

HOIST DRIVE CHAIN IDLER

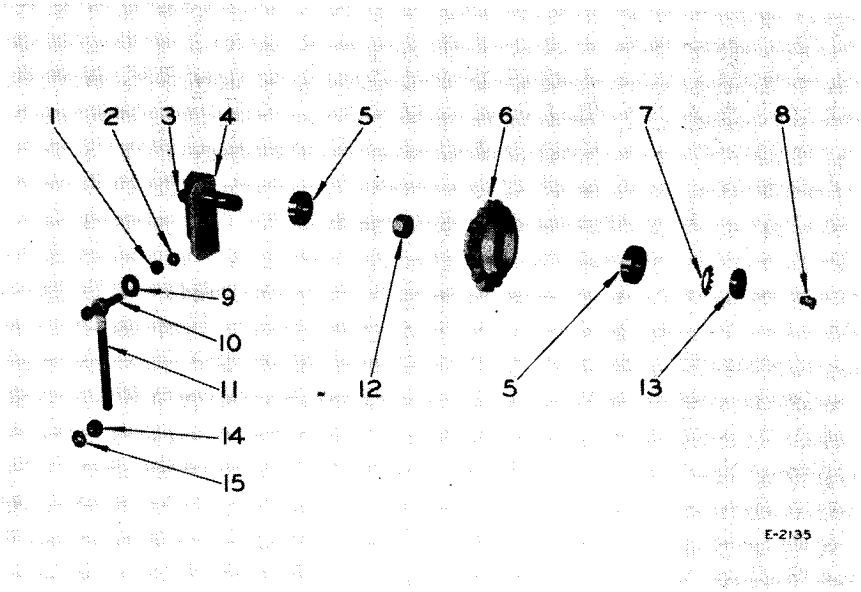


Figure 16 Hoist Drive Chain Idler

Ref. No.	Description	Ref. No.	Description
1	Nut–½"	9	Washer–Plain
2	Nut–Jam–½"	10	Capscrew–½"x2¾"
3	Capscrew–½"x1¾"	11	Bolt
4	Bracket	12	Spacer
5	Bearing	13	Locknut
6	Sprocket	14	Nut–½"
7	Lockwasher	15	Nut–Jam–½"
8	Fitting–Grease		

DISASSEMBLY OF IDLER

Unbolt the idler bracket (4), Figure 16, from the frame to remove the idler assembly. Remove locknut (13) and lockwasher (7). Pull off sprocket (6). To remove bearings (5) from sprocket, slip spacer (12) to one side and drive against inner race of the bearing. After one bearing and spacer are removed the other bearing may be readily removed.

When replacing the bearings in the sprocket, place the grease retainer sides of the bearings to the outside.

HOIST

ASSEMBLY OF WORM SHAFT

(Continued from Page 5)

(20) into the bearing container. Place this assembly on the shaft. Place four gaskets (25) on the bearing container and put the shaft in place in the housing. Bolt the bearing container to the housing.

Assemble oil seal (1) and bearing cup (20) into the bearing container (17). The lip on the oil seal should be turned inward. Place four gaskets (25) on the bearing container, and slip bearing container over the worm shaft and bolt to the housing. Remove or add gaskets (25) until bearings are in proper adjustment. When bearings are properly adjusted the worm shaft will have 1/64" end play.

Assemble oil seal (1) into the bearing retainer (4). Place capscrews (2) and lockwashers (3) into holes in the bearing retainer and slip this assembly on the shaft, along with two gaskets (6). Assemble oil seal (9) and bearing (8) into the sprocket (10). A sufficient quantity of adjusting shims (7) should be placed on the shaft to locate the center line of sprocket as shown in Figure 15. After the sprocket has been placed on the shaft, place a sufficient number of adjusting shims (7) next to the bearing so that the bottom of notches in the spacer (11) are even with the end of the keyways in the shaft. Insert keys (12), install clutch (13), and secure with retaining washer (14) and capscrew (15).

POWER TAKE-OFF

REMOVAL OF DRIVE BELTS

Remove the rear shield, the left hoist brake control link (1), Figure 2, the friction clutch shifter (2), the chain and belt shield and the drive chain (3). Adjust the belt idler (9) upward to release the tension on the belts. Old belts (10) may now be removed and new belts installed. Always replace belts in complete sets.

REMOVAL OF DRIVING PLATES FROM HOIST DIRECT DRIVE CLUTCH

Remove the rear shield, the clutch shifter (2), Figure 2, and the clutch

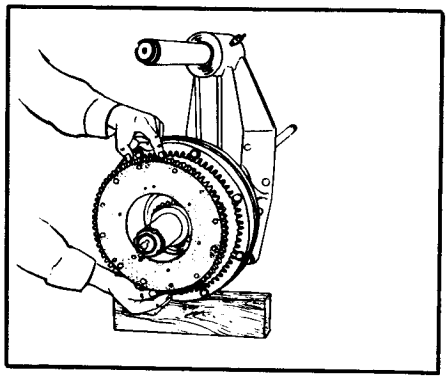


Figure 17 Removing Drive Plate

cone assembly (6) from the end of the shaft. Pull out the adjusting pin and unscrew the adjusting yoke assembly (7) and remove. Remove the floating plate and the first driving plate, Figure 17. Remove the six release springs and pull out the center plate. The second driving plate may now be easily removed.

New driving plates may be installed by reversing the above process. When installation is complete, adjust the clutch as described in the "Operations Section," Page 61.

REMOVAL OF DRIVING PLATES FROM HOIST REVERSE DRIVE CLUTCH

This clutch has driving plates which are split into three segments and in this manner differ from the direct drive clutch which has solid driving plates.

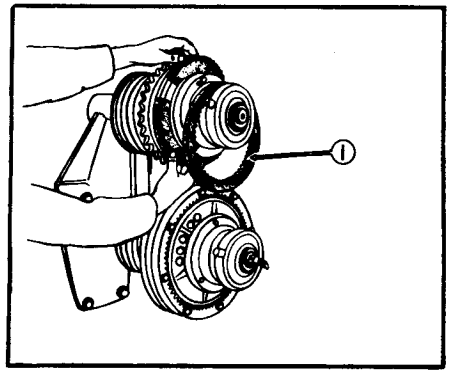


Figure 18 Removing Drive Plate Segments

Unbolt the driving ring (1), Figure 18, and slip toward the clutch cone assembly. The driving plate segments may now be easily removed.

These segments come in matched sets and when installing new segments, care should be taken to match the proper mating edges. The proper matching of the segments is shown in Figure 19.

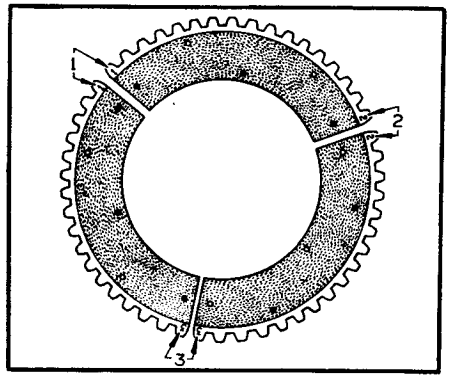


Figure 19 Matching Segments of Drive Plate

The installation will be simplified if the segments are put in their proper place and the clutch engaged sufficiently so they will not fall from their position, then the driving ring may be slipped over the segments and bolted in place.

The clutch should then be adjusted as described in the "Operations Section", Page 61.

HOIST DIRECT DRIVE CLUTCH

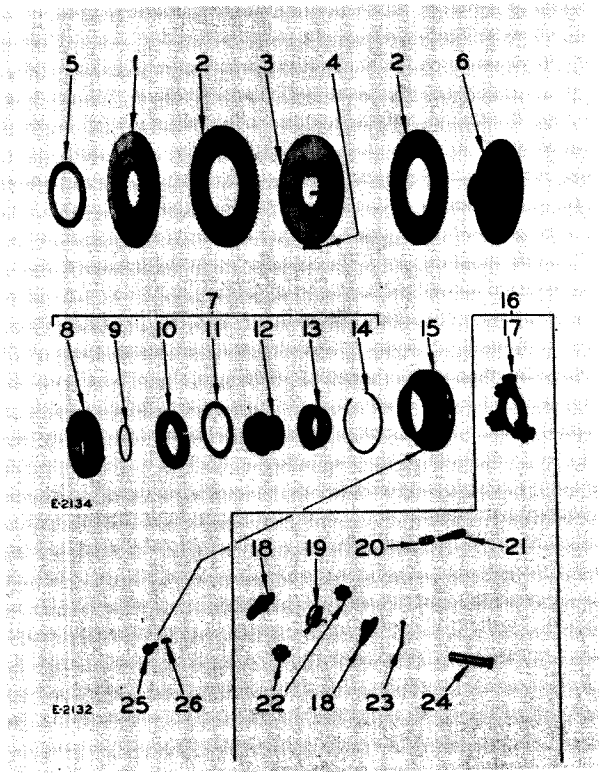


Figure 20 Hoist Direct Drive Clutch

Ref. No.	Description	Ref. No.	Description
1	Plate–Floating	14	Ring
2	Driving Plate Assembly	15	Cover
3	Plate–Center	16	Yoke Assembly
4	Springs	17	Yoke
5	Disc	18	Lever
6	Hub and Back Plate	19	Spring
7	Cone Assembly	20	Spring
8	Collar	21	Lockpin
9	Ring	22	Roller
10	Bearing	23	Cotter Pin
11	Washer	24	Pin
12	Sleeve	25	Capscrew
13	Cone	26	Lockwasher

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POWER TAKE-OFF

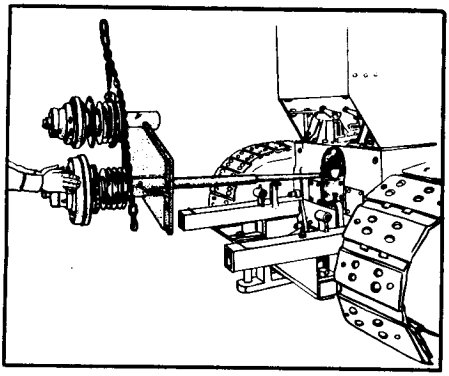

Figure 21 Removing Power Take-Off

DISASSEMBLY OF CONE ASSEMBLY

Remove the snap ring (14), Figure 20, and press cone collar (8) off the bearing. This will leave the snap ring (9) exposed, which may now be removed. The bearing (10) and the washer (11) may now be pressed off the cone sleeve (12). The cone sleeve (12) may now be pressed out of the cone ring (13).

The parts may be reassembled in reverse order.

DISASSEMBLY OF ADJUSTING YOKE ASSEMBLY

Remove the cover (15), Figure 20, the cotter pin (23) and then drive out lever pin (24). The levers (18), the spring (19), and the rollers (22) may now be removed and disassembled.

Parts may be reassembled in reverse order.

REMOVAL OF POWER TAKE-OFF

Remove the hoist assembly. For this procedure see "Removal of Hoist Assembly," Page 2 of the "Repair Section." Adjust the belt idler (9), Figure 2, upward to release the tension on the belts and remove belts (10). Block up or in some manner support the rear end of the countershaft and remove the bracket (8) which supports it. Remove the bolts holding the power take-off housing to the tractor and remove the assembly as in Figure 21.

DISASSEMBLY OF POWER TAKE-OFF

Figure 22 is a sectional view of the power take-off showing its construction. The two shaft assemblies are similar in construction, the lower shaft being extended to connect with the tractor drive shaft. The lower shaft assembly also contains the oil seal (1) which is not used in the upper shaft assembly. The method of disassembly described below applies to either the upper or the lower shaft.

Remove the clutch cone assembly (2) from the end of the shaft. Pull out the adjusting pin and unscrew the adjusting yoke assembly (3) and remove. The clutch floating plate (4) and the driving plate (5) may now be removed. Remove the clutch driving ring (6). Pull the hub and back plate as shown in Figure 23. Remove the key from the shaft and pull the sprocket and hub as shown in Figure 24. Pull the V-belt sheave as shown in Figure 25. Remove the sheave key from the shaft. The shaft may now be pressed from the housing as shown in Figure 26. The ball bearing (7), Figure 22, should remain on the shaft, and therefore, may be easily removed after the shaft is withdrawn from the housing. The ball bearing (8) will remain in the housing and may be driven out after the shaft is removed.

In the case of the lower shaft assembly the oil seal (1), Figure 22, will be pushed out by the bearing as the bearing is removed. To remove the bearings and oil seal from the sprocket and hub (9), slip the spacer (10) to one side and, using a punch, drive against the inner race of the bearing (11). After this bearing is removed the spacer may be removed and the bearing (12) and the oil seal (13) may be removed by driving against the outer race of the bearing (12).

REASSEMBLY OF POWER TAKE-OFF

On reassembly refer to Figure 22. During assembly care should be taken when installing spacers (14). Three of these spacers are normally required on each shaft, but more or less may be used to secure alignment of the sprockets. Never use less than one spacer in this position. Also note that the grease retainer sides of the bearings in the clutch sprocket hub are turned to the outside.

POWER TAKEOFF

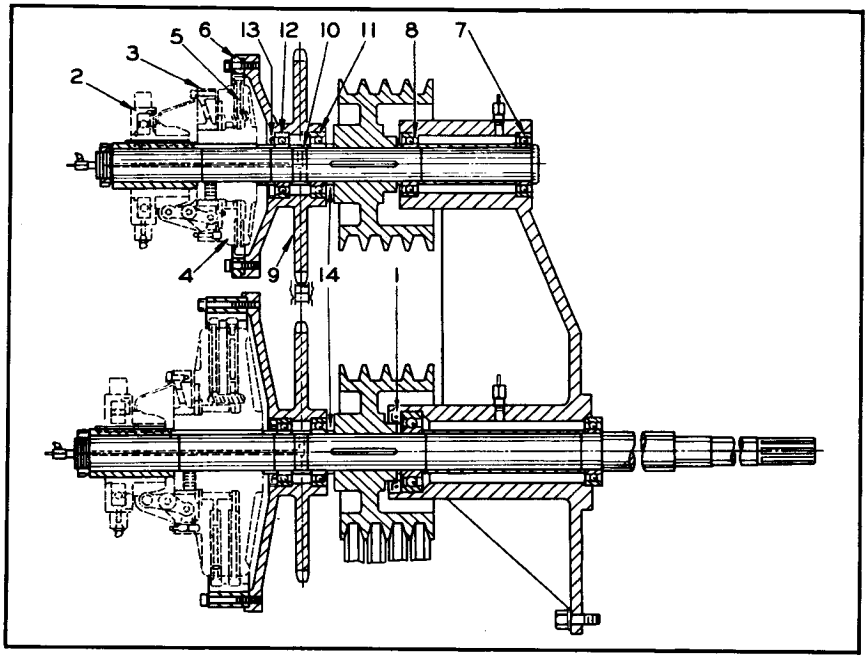

Figure 22 Power Take-Off Assembly

Ref. No.	Description
1	Seal–Oil
2	Cone Assembly
3	Adjusting Yoke Assembly
4	Plate–Floating
5	Driving Plate Assembly
6	Ring–Driving
7	Bearing
8	Bearing
9	Sprocket and Hub
10	Spacer
11	Bearing
12	Bearing
13	Seal–Oil
14	Spacer

POWER TAKE-OFF

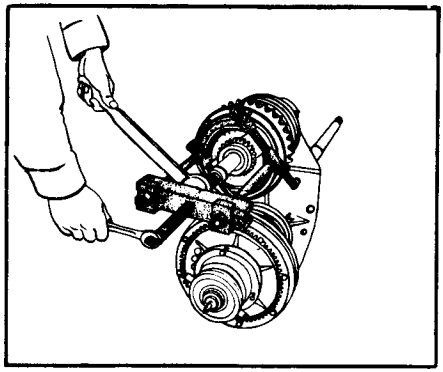

Figure 23 Pulling Hub and Back Plate

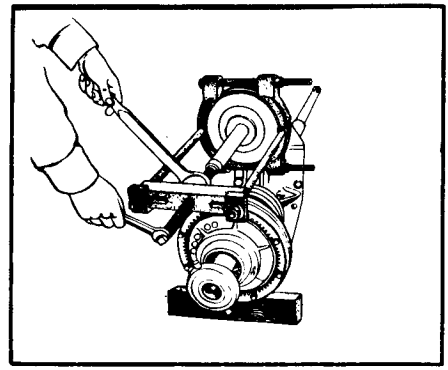

Figure 25 Pulling Sheave

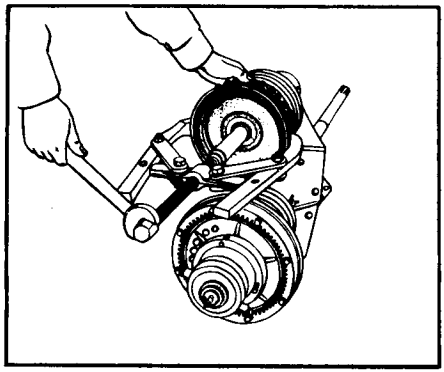

Figure 24 Pulling Sprocket and Hub

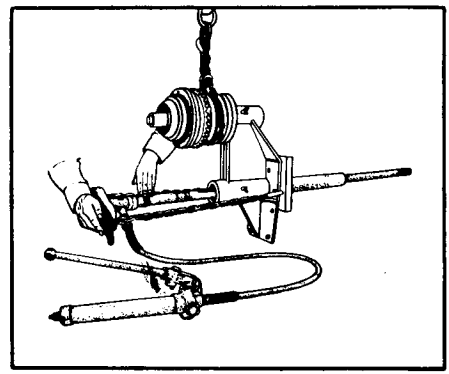

Figure 26 Removing Power Take-Off Shaft

PRIMARY COUNTERSHAFT

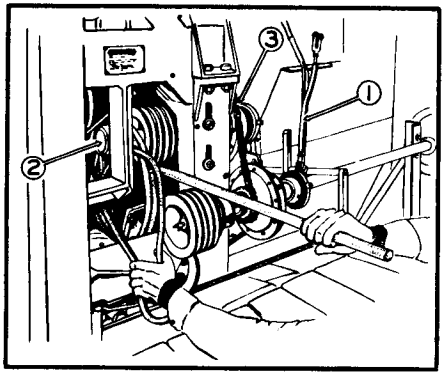

Figure 27 Removing V-Belts

REMOVAL OF DRIVE BELTS

Remove the shields which cover the friction clutches and the V-belts. Remove the clutch shifter (1), Figure 27. Loosen the bolts holding the reverse countershaft bearing cases to the frame and adjust the shaft downward to its bottom position. Remove the bolts which hold the bearing case (2) to the frame. Remove the adjustment bolt at

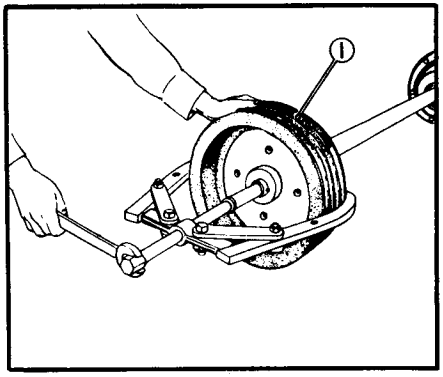

Figure 28 Pulling Large Sheave

bearing (2) and slip the belts off the sheaves. Pry the front end of the reverse countershaft back so the belts may be removed by passing them between the frame and the bearing case (2).

Always replace belts in complete sets. After installing and adjusting new belts, adjust the chain (3) by means of the adjustable idler.

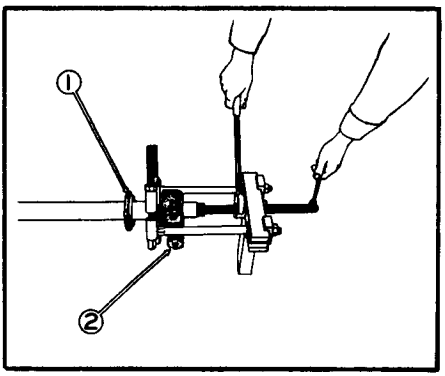

Figure 29 Pulling Bearing and Case

REMOVAL OF CLUTCH DRIVING PLATES

Remove the shield and clutch shifter (1), Figure 27, and follow the same procedure as on Page 8 under "Removal of Driving Plates from Hoist Reverse Drive Clutch" of "Repair Section."

When reinstallation is complete, adjust the clutch as described in the "Operations Section", Page 61.

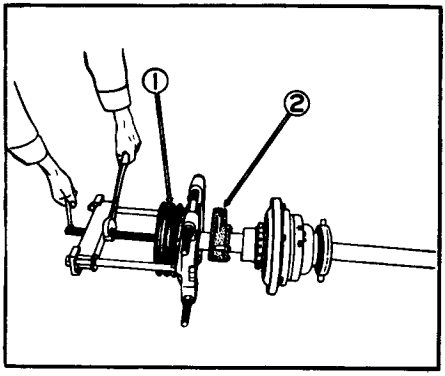

Figure 30 Pulling Small Sheave

REMOVAL OF PRIMARY COUNTERSHAFT

Remove the rear shield and both shields that cover the friction clutches and the V-belts. Remove the clutch shifter (1), Figure 27, the chain (3) and the V-belts from both sheaves by slacking off on the belt adjustments. Remove the countershaft bearing bolts and remove the shaft assembly.

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PRIMARY COUNTERSHAFT

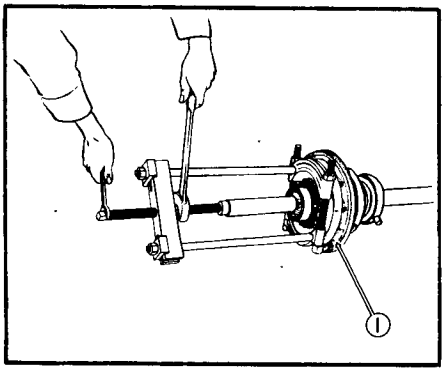

Figure 31 Pulling Sprocket and Hub

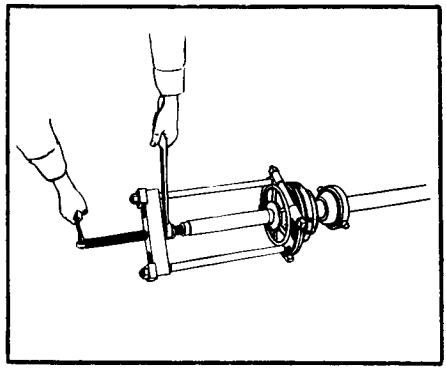

Figure 32 Pulling Hub and Back Plate

DISASSEMBLY OF PRIMARY COUNTERSHAFT

Remove the locknut, the lockwasher, and pull the large sheave (1), Figure 28. Unbolt the cover (1), Figure 29, and slip back from the bearing case as shown. Pull the bearing case (2) which removes the bearing, the oil seal and two spacers. All other parts have to be removed from the opposite end of the shaft. Remove the locknut, the lockwasher, and pull the small sheave (1), Figure 30. The bearing case (2) with the bearing and oil seal may be pulled as shown in Figure 29. Pull the clutch sprocket and hub (1), Figure 31. To remove the bearings and oil seal from the clutch sprocket and hub (1), slip the spacer to one side and, using a punch, drive against the inner race of the bearing. After removal of the bearing, lift out the spacer and drive out the bearing and oil seal by driving against the outer race. Pull the clutch hub and back plate as in Figure 32.

For "Disassembly of Clutch Cone Assembly" and "Disassembly of Adjusting Yoke Assembly", see instructions on Page 10 of the "Repair Section."

REASSEMBLY OF PRIMARY COUNTERSHAFT

For reassembly refer to Figure 33 and note that the grease retainer sides of the bearings in the clutch sprocket and hub are to be turned to the outside and the bearing case covers are to be turned toward the clutch.

When the shaft is reassembled and in place, adjust the clutch as described in the "Operations Section", Page 61.

DRIVE BELT IDLER

DISASSEMBLY OF IDLER

Proceed as is indicated in the instructions under "Drive Chain Idler" Page 6 of the "Repair Section."

When replacing the bearings in the pulley, place the grease retainer sides of the bearings to the outside.

PRIMARY COUNTERSHAFT

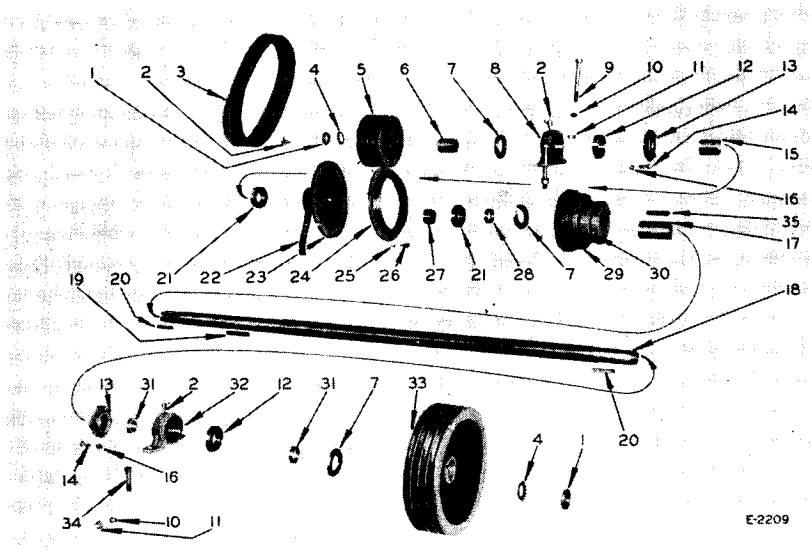

Figure 33 Primary Countershaft

Ref. No.	Description	Ref. No.	Description
1	Locknut	19	Key–Clutch
2	Fitting–Grease	20	Key–Sheave
3	Belt	21	Bearing
4	Lockwasher	22	Chain
5	Sheave	23	Sprocket and Hub
6	Spacer	24	Ring–Driving
7	Seal–Oil	25	Lockwasher–⅜"
8	Housing	26	Capscrew–⅜"
9	Capscrew–⅝"	27	Spacer
10	Lockwasher–⅝"	28	Spacer
11	Nut–⅝"	29	Clutch–Countershaft
12	Bearing	30	Fitting–Grease
13	Cover	31	Spacer
14	Capscrew–¼"	32	Housing
15	Spacer	33	Sheave
16	Lockwasher–¼"	34	Capscrew–⅝"
17	Sleeve	35	Key–Sleeve
18	Countershaft		

REVERSE DRIVE SHAFT

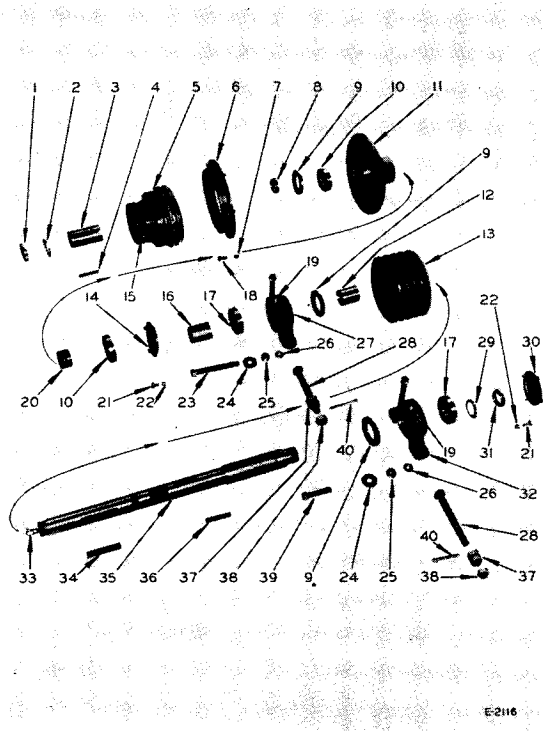

Figure 34 Reverse Countershaft

Ref. No.	Description	Ref. No.	Description
1	Locknut	21	Capscrew—¼"
2	Lockwasher	22	Lockwasher—¼"
3	Sleeve	23	Capscrew—⅝"x5¾"
4	Key—Sleeve	24	Washer—Plain—⅝"
5	Countershaft Clutch	25	Nut—⅝"
6	Ring—Driving	26	Nut—Jam—⅝"
7	Lockwasher—⅜"	27	Housing
8	Spacer	28	Bolt
9	Seal—Oil	29	Lockwasher
10	Bearing	30	Cover
11	Sprocket and Hub	31	Locknut
12	Spacer	32	Housing
13	Sheave	33	Fitting—Grease
14	Cover	34	Key—Clutch
15	Fitting—Grease	35	Shaft
16	Spacer	36	Key—Sheave
17	Bearing	37	Nut—¾"
18	Capscrew—⅜"	38	Nut—Jam—¾"
19	Fitting—Grease	39	Capscrew—⅝"x2½"
20	Spacer	40	Cotter Pin

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REVERSE DRIVE SHAFT

REMOVAL OF CLUTCH DRIVING PLATES

Remove the shield and clutch shifter (1), Figure 27, and follow the same procedure as on Page 8 under "Removal of Driving Plates from Hoist Reverse Drive Clutch" of the "Repair Section."

When the installation is complete the clutch should then be adjusted as described in the "Operations Section", Page 61.

REMOVAL OF REVERSE DRIVE SHAFT

Remove the shields which cover the friction clutches and the V-belts. Remove the clutch shifter (1), Figure 27. Loosen the bearing bolts and adjust the shaft downward to its bottom position. Remove V-belts, bearing bolts, and lift out the shaft assembly.

DISASSEMBLY OF REVERSE DRIVE SHAFT

Remove nut (1) and lockwasher (2), Figure 34, and the cone assembly from the end of the shaft. Pull out the adjusting pin and unscrew the adjusting yoke assembly and remove. The clutch floating plate and the driving plate may now be removed. Remove the clutch driving ring and pull the hub and back plate, Figure 23. Remove the key from the shaft and pull the clutch sprocket and hub, Figure 24. Remove the bearing cover and pull the bearing case (2), Figure 29. Pull the sheave (1), Figure 30. Remove the bearing case cover (30), Figure 34, and pull the bearing case only. Slide the oil seal back, remove the bearing lock nut and lockwasher, and pull the bearing.

For "Disassembly of Clutch Cone Assembly" and "Disassembly of Adjusting Yoke Assembly", see instructions on Page 10 of the "Repair Section."

REASSEMBLY OF REVERSE COUNTERSHAFT

For reassembly of the reverse shaft, refer to Figure 34 and note the grease retainer sides of the bearings are to be turned to the outside in the clutch sprocket and hub; the bearing cover side of the bearing case (27) is turned toward the sprocket.

On reassembly first adjust the tension of the V-belts and then adjust the chain tension by the sprocket idler adjustment. The clutch should then be adjusted as described in the "Operations Section", Page 61

REVOLVING DRIVE CHAIN IDLER

DISASSEMBLY OF IDLER

Proceed as is indicated in the Instructions under "Drive Chain Idler," Page 6 of the "Repair Section."

When replacing the bearings in the sprocket, place the grease retainer sides of the bearings to the outside.

SWIVEL HOOK BLOCK

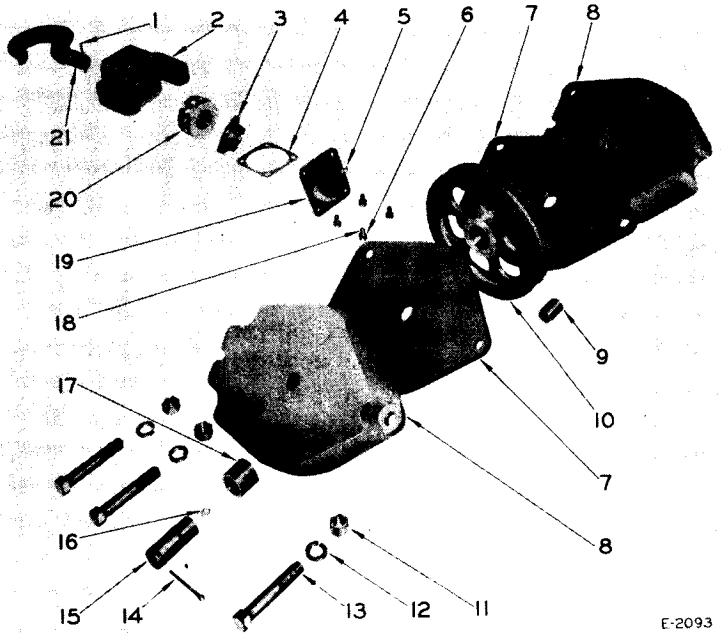


Figure 35 Swivel Hook Block

Ref. No.	Description	Ref. No.	Description
1	Cotter Pin–¼"x2"	12	Lockwasher–¾"
2	Housing	13	Capscrew–¾"x4¾"
3	Nut	14	Cotter Pin–$\frac{7}{32}$"x2½"
4	Gasket	15	Shaft
5	Fitting–Grease	16	Fitting–Grease
6	Lockwasher–⅜"	17	Bushing
7	Plate–Side	18	Capscrew–⅜"x1"
8	Weight	19	Cover
9	Spacer	20	Bearing
10	Sheave	21	Hook
11	Nut–¾"		

BOOM AND CABLES

DISASSEMBLY OF SWIVEL HOOK BLOCK

Remove the three bolts (13), Figure 35, and remove the hook assembly and the weights (8). Remove cotter pin (14) and drive out shaft (15). The hook assembly may be disassembled by removing the cover (19), and the cotter pin (1), and unscrewing the nut (3).

On reassembly tighten the nut (3) so that the hook has only a small amount of end play. Excessive tightening of the nut (3) will cause clamping of the hook.

REPLACING SHEAVE BUSHINGS

Start new bushing (1), Figure 36, into the sheave. By using a hardwood block as shown, damage to the bushing is avoided. USE PRESS IF AVAILABLE. As the new bushing is driven into place, the old bushing will be driven out.

HOW TO REEVE LINES

For reeving of lines see Figures 24 and 25 in "Operations Section."

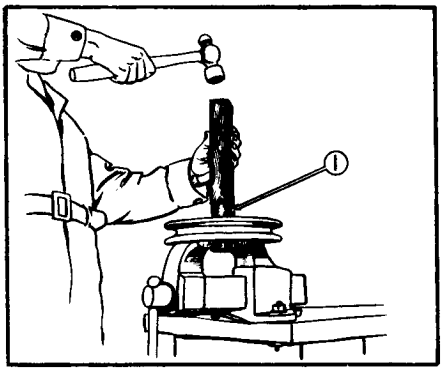


Figure 36 Replacing Sheave Bushings

REMOVAL OF BOOM

Lower the boom to the ground and remove the load line and boom line clamps (4), Figure 37, connecting the wire rope to the boom and load blocks. Disconnect the necessary boom light wiring if the machine is equipped with it.

Spool the wire rope on the hoist drums until it clears the blocks. Support the boom at the balance point and disconnect by removing the cotter pins and driving out the pins at the hinge point.

BOOM COLUMN

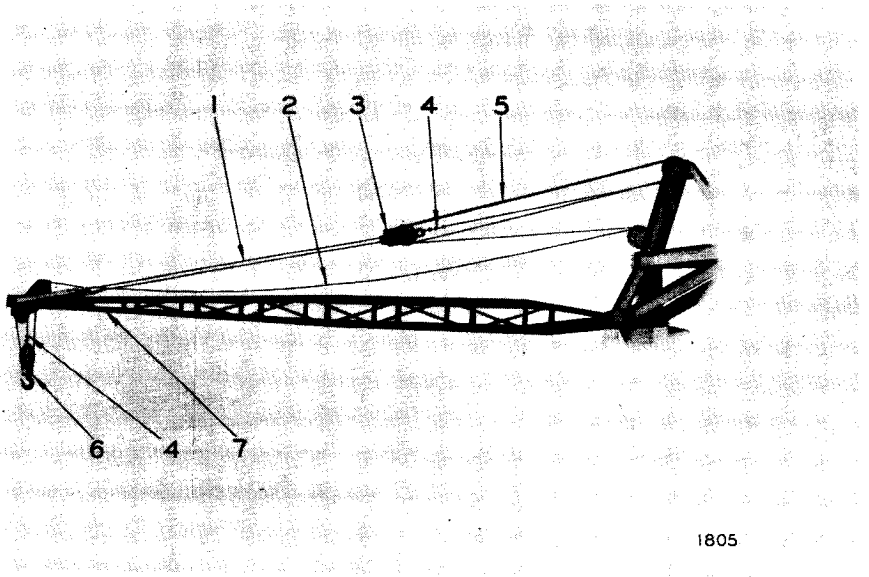
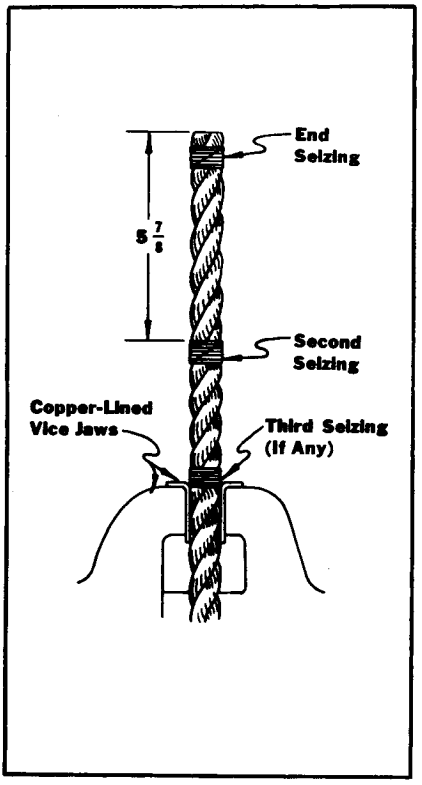


Figure 37 Boom Column

Ref. No.	Description
1	Cable–Bridle
2	Cable–Load
3	Bridle Sheave
4	Clamp
5	Cable–Boom
6	Swivel Hook Block
7	Boom

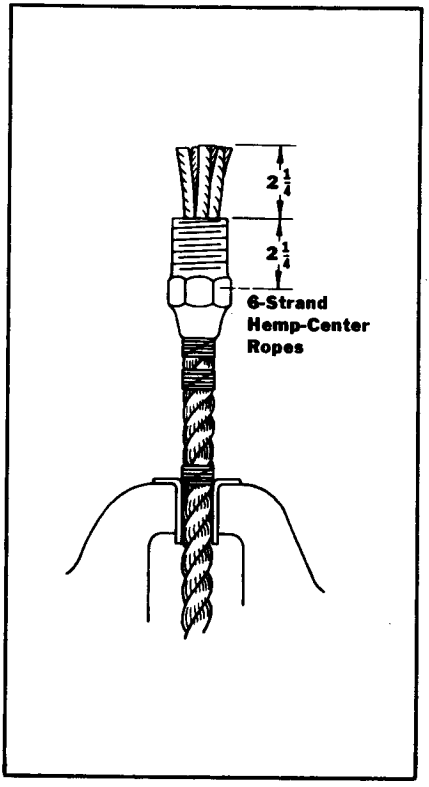
REPLACEMENT OF WIRE ROPE CLAMP ON BOOM BRIDLE CABLE

(Illustrations by courtesy Electroline Company)



— 1 —

Grip the rope vertically in a vise with copper-lined jaws. If there is only one seizing in use, apply a second seizing at dimension designated in the above illustration.

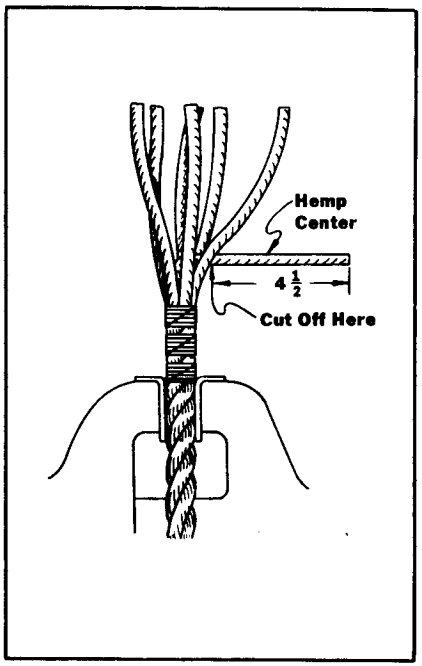


— 2 —

Before applying the sleeve, drive the end seizing close enough to the end of the rope so the sleeve can be easily started over it. Using a bar of copper or a piece of hardwood to protect the edge of the sleeve, drive the sleeve and seizings down along the rope until the rope projects 2¼" as illustrated. With the socket screwed on a few turns, most of the required distance can be obtained by hammering the end of the fitting.

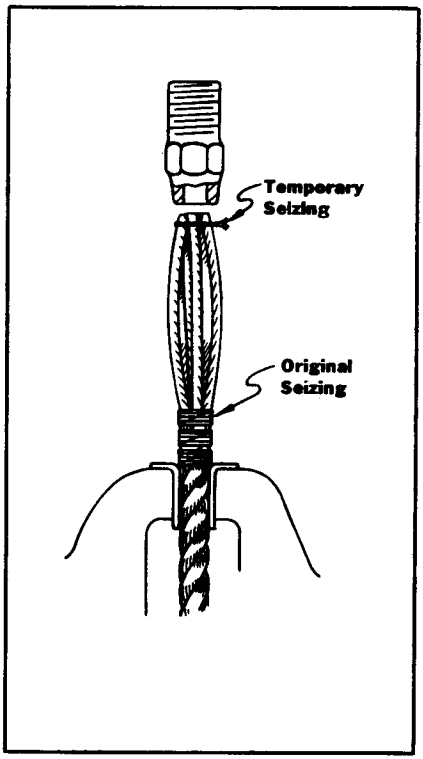
REPLACEMENT OF WIRE ROPE CLAMP ON BOOM BRIDLE CABLE

(Illustrations by courtesy Electroline Company)



— 3 —

After the seizings have been driven to the correct location, grip the rope in the vise just below the seizings and remove the sleeve temporarily. Pull the hemp center out to one side between strands far enough so that it can be cut off 4½" as illustrated. Then push the hemp stub back into the center of the rope. Do not broom out wires for hemp-center plugs, but keep them twisted together in separate strands. Remove the rope from the vise and for best results thoroughly wash off all lubricant from the outside of each strand in gasoline, especially on the inner surface where the plug will grip.

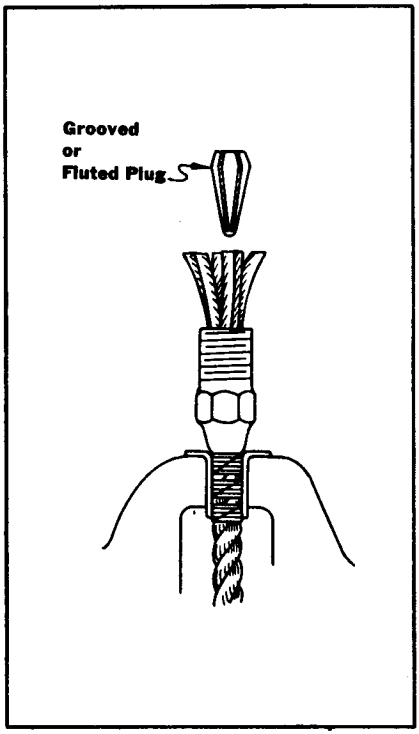


— 4 —

Apply the sleeve as follows: With the fingers on small ropes, or with a temporary one-turn seizing wire tightened with pliers on larger ropes, compress the strands together at the top until the sleeve can be twisted and pushed over the rope. Remove the temporary seizing and force the sleeve down to the original seizings.

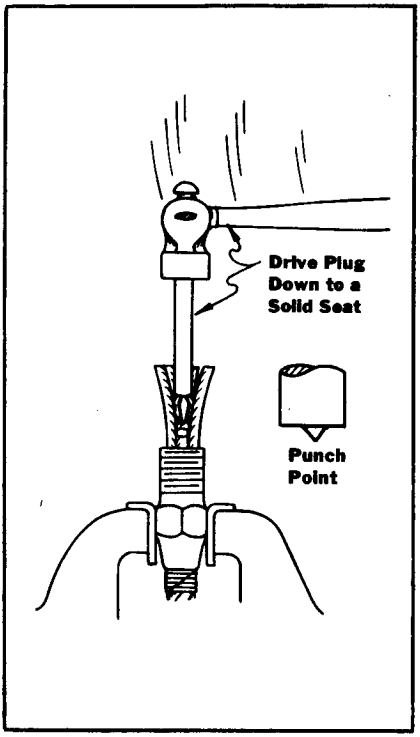
REPLACEMENT OF WIRE ROPE CLAMP ON BOOM BRIDLE CABLE

(Illustrations by courtesy Electroline Company)



– 5 –

Grip the rope in the vise over the seizings so **the end of the sleeve bears solidly against the vise jaws.** Insert the plug in the center between the strands. See that the various strands are seated in their respective grooves. With hammer and punch, tap the plug down gently. While doing this, grip the strand ends by hand around the outside of the punch and rotate them slightly in a direction opposite to the lay of the rope. This permits the strands to adjust themselves properly in the grooves.

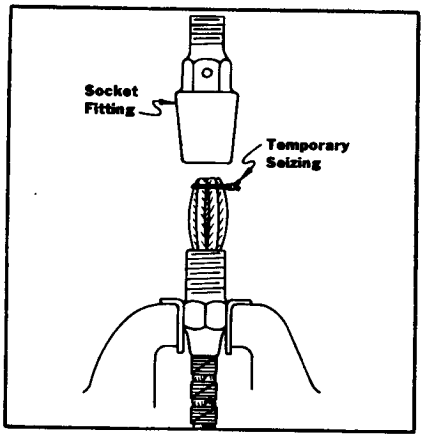


– 6 –

Drive the plug down to a moderate seat sufficient to hold the rope, sleeve, and plug safely together, then grip the sleeve securely in the vise against the hexagon form. Drive the plug in **solidly**, making sure that it goes down as far as possible. Driving effort naturally should be in proportion to the size of rope and fittings in use.

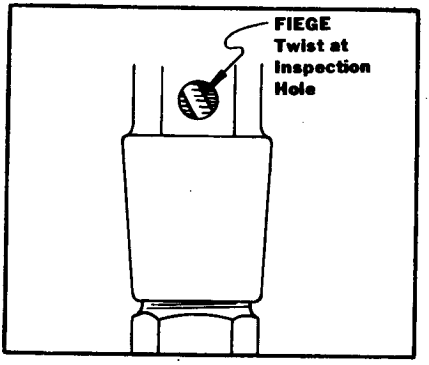
REPLACEMENT OF WIRE ROPE CLAMP ON BOOM BRIDLE CABLE

(Illustrations by courtesy Electroline Company)



– 7 –

With the fingers, bend all strands together behind the plug; or if necessary again apply a temporary one-turn seizing wire and tighten with pliers to get all strands entered in the open end of the socket. After the strands have entered the socket, remove the temporary seizing. Then push and twist the socket down to the sleeve till the threads are engaged. Screw the socket down firmly. Wrench torque naturally should be in proportion to the size of rope and fittings in use. Remove all seizings.

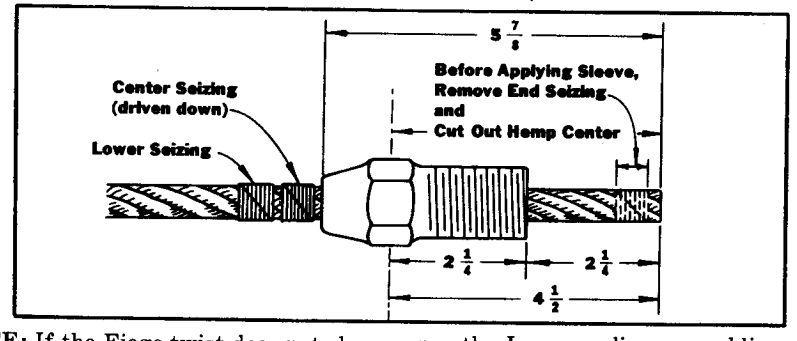


– 8 –

View the Fiege twist at the inspection hole. If the installation has been properly made, the strands will be fully visible and twisted across the inspection hole at an angle to the axis of the rope and fitting.

If the Fiege twist does not show up across the inspection hole after carefully following the above instructions, it indicates that not enough rope has been allowed to project beyond the sleeve mouth. In succeeding assemblies, allow somewhat more rope to project beyond the sleeve until the Fiege twist shows up satisfactorily.

CABLE EXTENSION DIMENSIONS FOR INSTALLING ELECTROLINE-FIEGE FITTINGS



NOTE: If the Fiege twist does not show across the inspection hole after carefully following assembly instructions, it indicates that not enough rope has been allowed to project beyond the sleeve mouth. In succeeding assemblies, allow somewhat more rope to project beyond the sleeve until the Fiege twist shows up satisfactorily.

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MAST ASSEMBLY

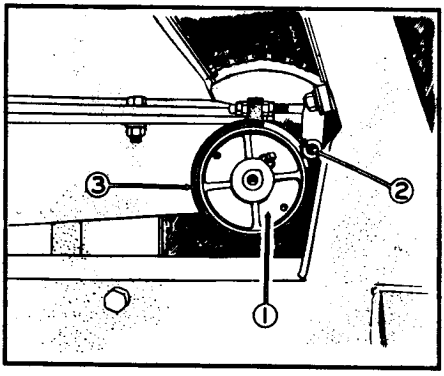

Figure 38 Removing Mast Brake Drum and Band

MAST WORM SHAFT BRAKE

The gear mechanism that revolves the mast is equipped with an automatic safety brake. When the operating lever which controls both clutches is moved to neutral position, the brake immediately checks rotation of the boom.

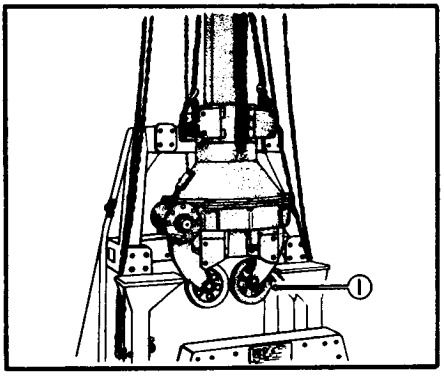

Figure 39 Assembly or Removal of Mast

REPLACEMENT OF BRAKE BAND

Pull the brake drum (1), Figure 38, and remove the brake band pin (2). Remove the brake band (3) by removing nuts from the adjusting bolt.

On replacement of the band, adjust the band to approximately $\frac{1}{32}$" clearance on the brake drum with the brake in the released position.

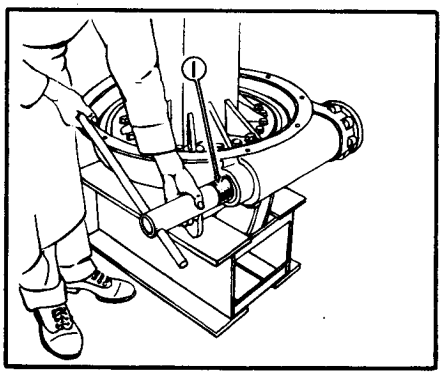

Figure 40 Removing Worm Shaft Locknut

REMOVAL OF MAST ASSEMBLY

Lower the boom and remove. See instructions on Page 19 of the "Repair Section." Disconnect boom light wiring, if equipped with it. Spool the

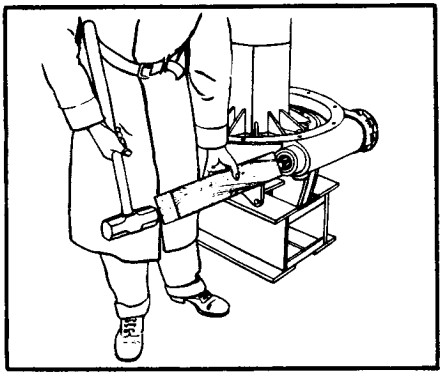

Figure 41 Removing Worm Shaft

wire rope on the hoist drums. Remove the counterweight rack, the shields that cover the friction clutches, the clutch shifter (1), Figure 27, and the chain (3). Pull the brake drum (1), Figure 38, and remove the brake band, and sprocket on the opposite end of the shaft. Disconnect and remove the speed control and the compression release

MAST ASSEMBLY

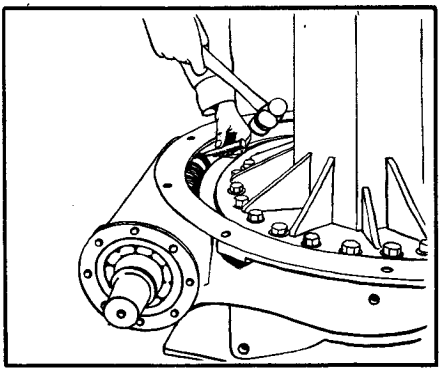

Figure 42 Prevention of Damage to Worm Gear

linkage and assembly. Unbolt the D-section of the frame in front of the operator and remove. Unbolt and remove the collector ring on the bottom end of the mast if the crane is equipped with a boom light. Take hold of the mast assembly as in Figure 39 and remove the remaining housing bolts and

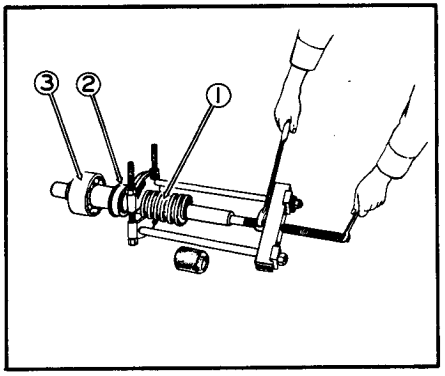

Figure 43 Pulling Mast Worm

hoist out mast assembly. Remove the sheaves (1) before lowering the mast assembly.

DISASSEMBLY OF MAST ASSEMBLY

Unbolt and remove the upper housing.

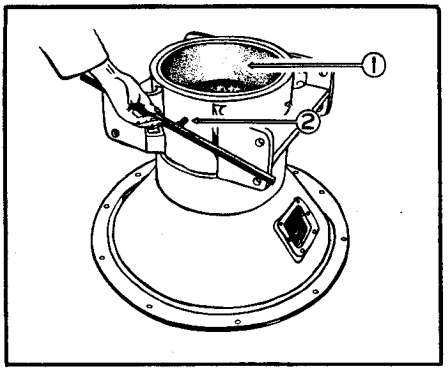

Figure 44 Securing Column Bushing

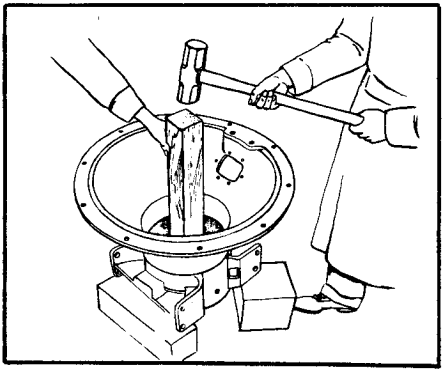

Figure 45 Removing Column Bushing

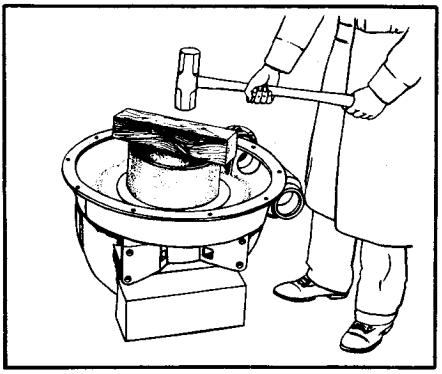

Figure 46 Replacing Column Bushing

MAST COLUMN

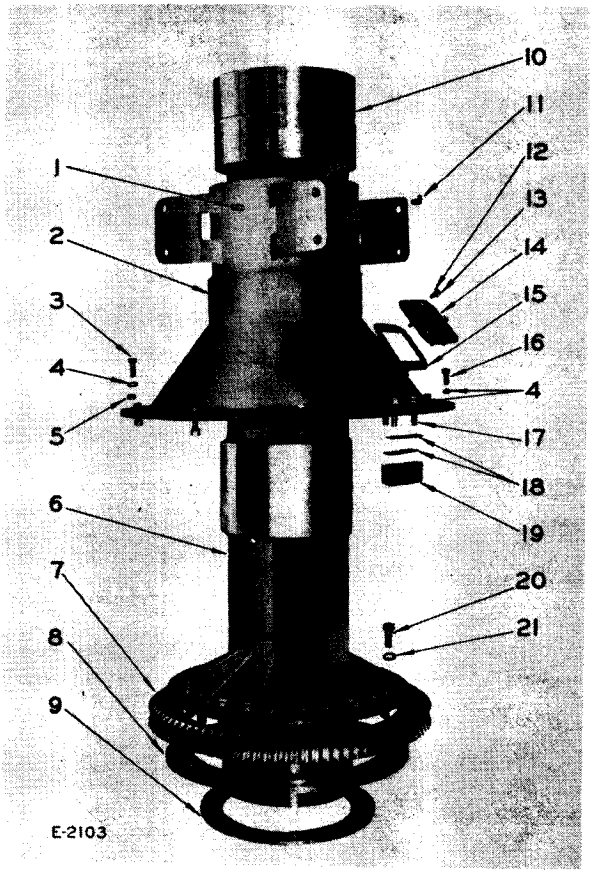

Figure 47 Mast Column

Ref. No.	Description	Ref. No.	Description
1	Pin–Dowel	12	Lockwasher–3/8"
2	Housing	13	Capscrew–3/8"
3	Capscrew–1/2"x1 3/4"	14	Cover
4	Lockwasher–1/2"	15	Gasket
5	Nut–1/2"	16	Capscrew–1/2"x1 1/4"
6	Mast	17	Capscrew–1/2"x1 1/2"
7	Gear	18	Shim
8	Ring	19	Bar
9	Washer	20	Capscrew–3/4"
10	Bushing	21	Lockwasher–3/4"
11	Fitting–Grease		

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MAST ASSEMBLY

Using wrench No. 152-1731 remove nut (1) on worm shaft, Figure 40. Unbolt the worm shaft bearing cover and drive out the worm shaft, Figure 41, rotating the worm shaft counterclockwise as the shaft is driven out. In driving out the worm shaft care should be taken to keep the bearing driven back in the housing, Figure 42, thus preventing damage to the worm gear.

Pull worm (1), Figure 43, and remove the bearings (2) and (3).

Hoist out the mast and unbolt for removal of the worm gear. To remove the bushing (1) in the upper housing, first remove dowel pin (2), Figure 44, and drive or press out, using a piece of 1" thick steel plate 12½" in diameter. See Figure 45.

In a similar manner remove the bushing

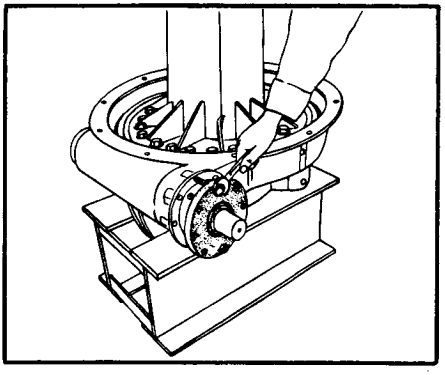

Figure 49 Replacing Worm Shaft

Figure 46. After driving the bushing flush with the upper housing, using $31/64$" drill, drill bushing until POINT ONLY of the drill shows on the inside of the bushing. After drilling hole in the bushing, drive dowel pin in the hole

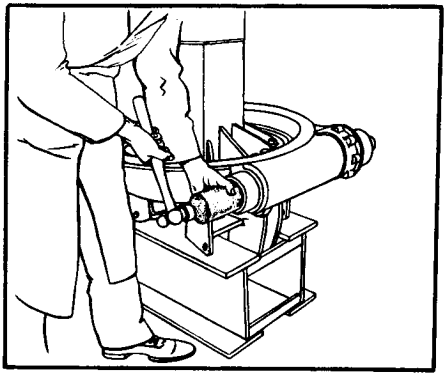

Figure 48 Replacing Worm Shaft Bearing

from the lower housing.

BUSHING REPLACEMENT

Using white lead as a sealer, press or drive the bushings into the housing,

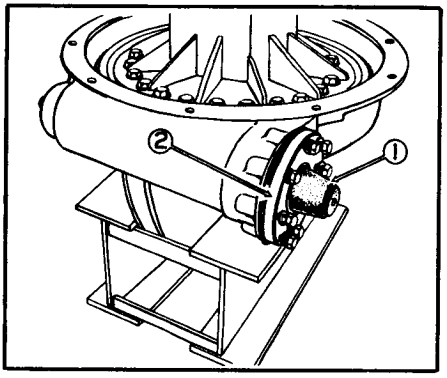

Figure 50 Replacing Oil Seal

until it is flush with bolting surface as in Figure 44.

REASSEMBLY OF MAST ASSEMBLY

Using 10 setting on torque wrench No. 1-6865, tighten the bolts (20), Figure

MAST ASSEMBLY

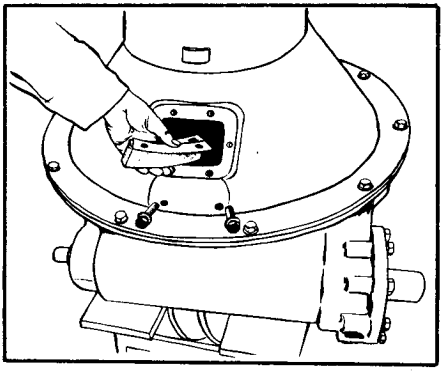

Figure 51 Installing Thrust Block

47, securing the worm gear to the mast proper. Using WB grease give the thrust washer (9) and the seat in the lower housing as well as the bronze bushing in the upper and lower housing a liberal coating. Insert the thrust washer (9) in the housing and hoist the mast (6) and lower into position.

Using a piece of 3¼" diameter steel shafting, drive the bearing into place, Figure 48. The bearing serves as a pilot for the worm shaft assembly, which is the next item to be inserted. Using a varied length capscrew, ½"x3¾", ½"x2¾", and regular cover capscrews, draw the worm shaft assembly into place, seating in the housing, Figure 49. Remove the cover and using a sealing compound (shellac, etc.), insert the oil seal into the cover as well as the oil seal in the worm housing. Use enough gaskets to seal off the housing and use oil seal adapter tool (1), Figure 50, to bolt the bearing cover (2) into place. The special tool part number is 152-6621.

Before the replacement and bolting in place of the housing (2), Figure 47, remove the retaining bar (19). After bolting the housings together, insert the bar (19) through the opening. Using feeler gauges, determine the shims required for an operating clearance of 0.010 to 0.015, the operating clearance being between the worm gear (7) and the retaining bar (19). Insert the necessary shims and bolt the bar in place, Figure 51.

Fill the case with lubricating oil and replace the cover. See Lubricating Instructions, Page 41 in "Operations Section." The mast assembly is now ready to be replaced in the frame.

From this point on the reassembly is just a matter of reversal of disassembly.

FRAME

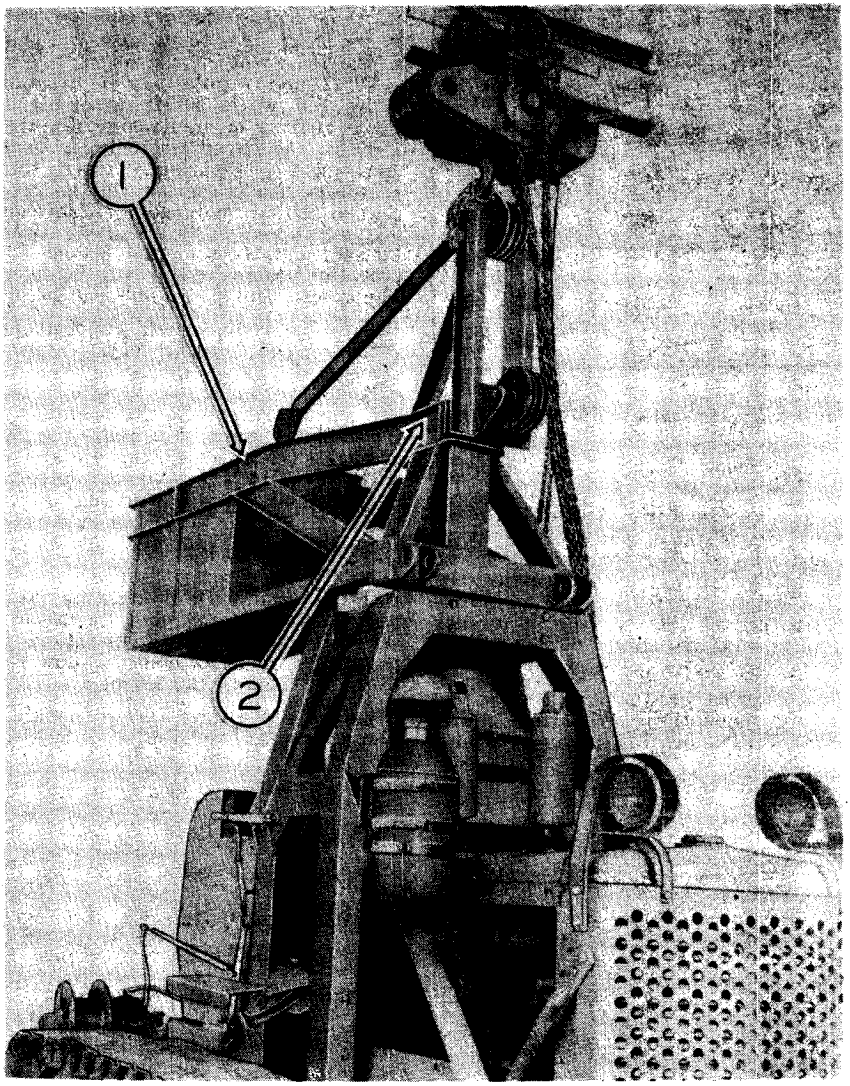

Figure 52 Removing Sheave Frame

REMOVAL OF SHEAVE FRAME

Lower the boom and remove the load line and the boom line clamps connecting the wire rope to the boom and the load blocks. Spool the wire rope on the hoist drums.

Remove the bolts at points 1 and 2, Figure 52, and remove the frame.

REMOVAL OF COUNTERWEIGHT FRAME

Disconnect the necessary boom light wiring if the machine is equipped with it. Support the boom at the balance

FRAME

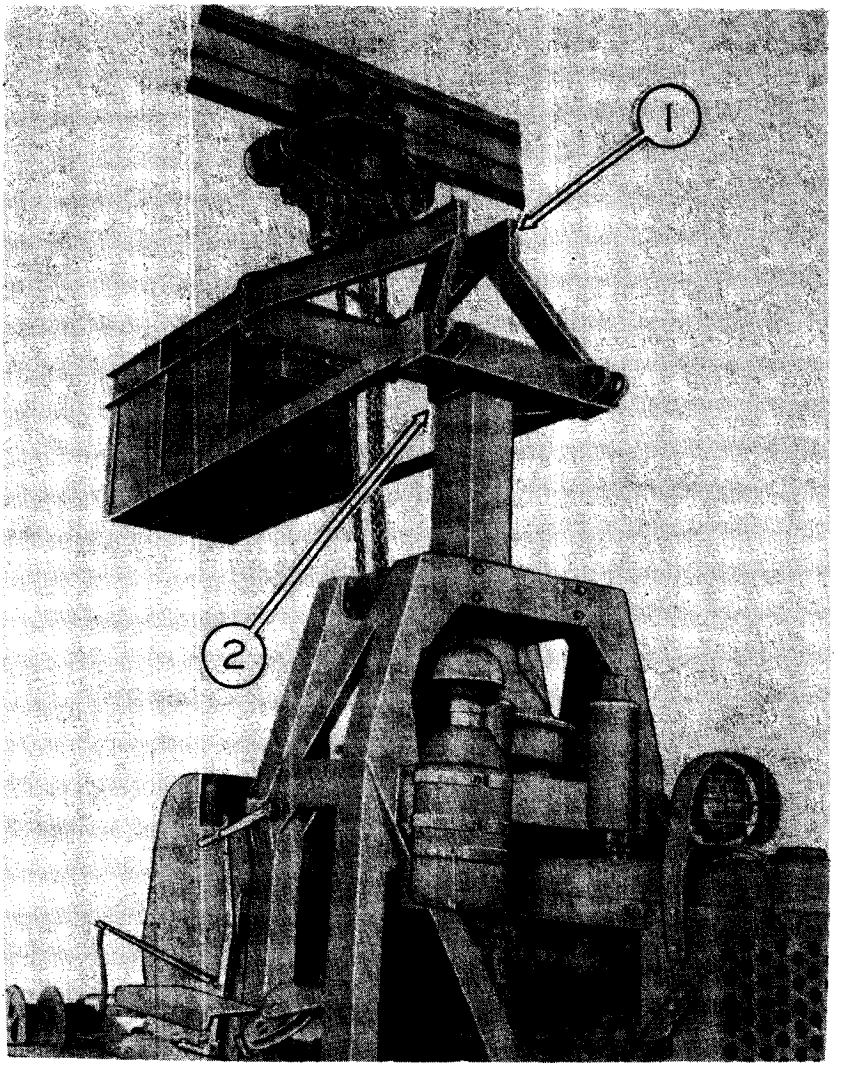

Figure 53 Removing Counterweight Frame

point and remove the boom by removing the hinge pins.

Remove the counterweights, grouser plates and grouser bolts from the frame boxes. Remove the clamp bolts at points 1 and 2, Figure 53, and hoist the frame above the mast column and remove.

REMOVAL OF MAIN FRAME

Proceed as in the preceding headings and continue. Remove the "Primary Countershaft." See instructions on "Removal of Primary Countershaft" beginning on Page 13 of the "Repair Section."

FRAME

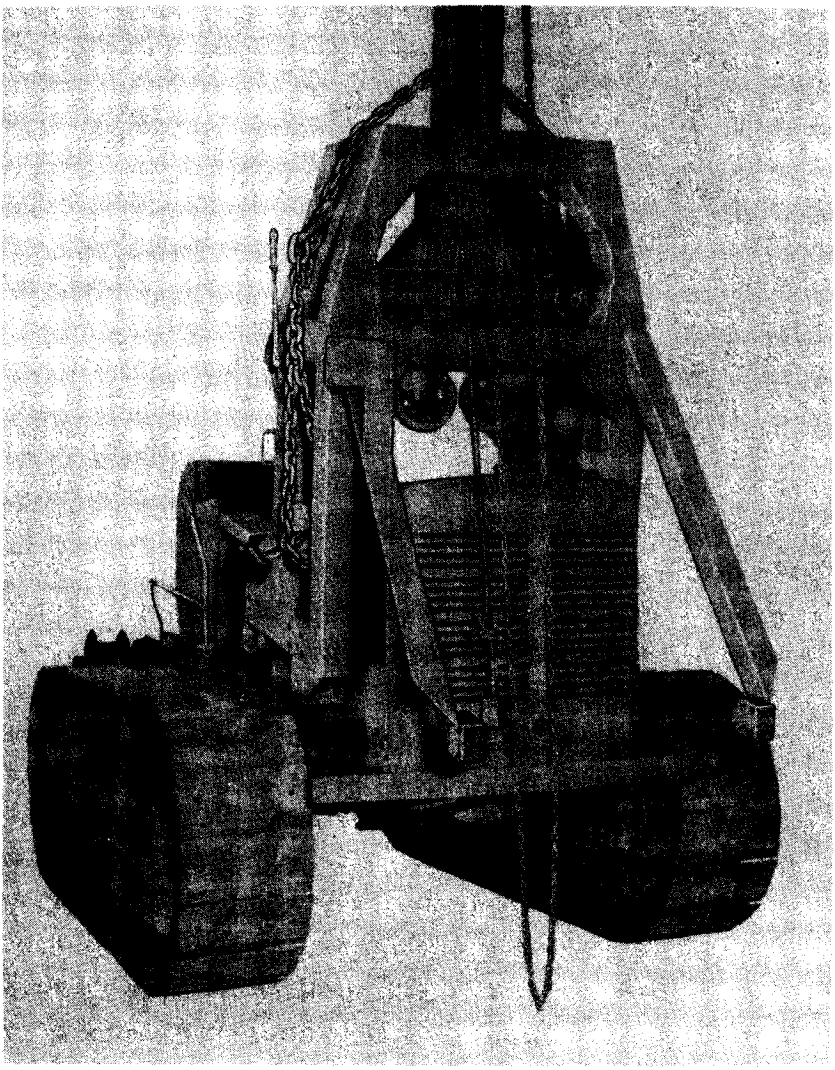

Figure 54 Removing Main Frame

Remove the air cleaner, mufflers, head lamps, radiator guard and braces, and the bolts designated as (A), as shown in Figure 15 of the "Operations Section." Disconnect and remove the throttle and the compression release linkage.

Support the main frame, Figure 54, and unbolt at frame mounting points. Hoist the frame as shown and remove over the radiator end of the tractor.

REPLACEMENT OF MAIN FRAME

The replacement of the frame assembly is just a matter of reversing the above procedure. See "Frame Mounting Instructions" beginning on Page 20 of the "Operations Section."

TABLE OF TOLERANCES FOR BEARINGS

BALL AND ROLLER BEARINGS

Bearing Number	Location	Group Number	Housing Diameter	Shaft Diameter
1-4935	Power Take-Off.....	2-1	$3\frac{.3463}{.3473}$	$1\frac{.7721}{.7716}$
	Mast Worm Shaft.....	8-3	$3\frac{.3465}{.3479}$	$1\frac{.7721}{.7716}$
	Mast Worm Shaft.....	8-4	$3\frac{.3465}{.3479}$	$1\frac{.7721}{.7716}$
	Hoist Direct Drive.....	2-2	$3\frac{.3457}{.3467}$	$1\frac{.7721}{.7716}$
	Hoist Reverse Drive.....	2-4	$3\frac{.3457}{.3467}$	$1\frac{.7721}{.7716}$
	Primary Countershaft	3-1	$3\frac{.3457}{.3467}$	$1\frac{.7721}{.7716}$
	Reverse Countershaft.....	5-1	$3\frac{.3457}{.3467}$	$1\frac{.7721}{.7716}$
1-5222	Primary Countershaft	3-1	$3\frac{.3465}{.3479}$	$1\frac{.7721}{.7716}$
1-5237	Mast Worm Shaft.....	8-3	$5\frac{.5116}{.5128}$	$2\frac{.1659}{.1653}$
1-5238	Power Take-Off.....	2-1	$3\frac{.9368}{.9378}$	$1\frac{.7721}{.7716}$

(Continued on Page 34)

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TABLE OF TOLERANCES FOR BEARINGS

BALL AND ROLLER BEARINGS (Cont.)

Bearing Number	Location	Group Number	Housing Diameter	Shaft Diameter
1-5239	Hoist Chain Idler.....	1-6	2 .0460 / .0470	.9840 / .9835
	Countershaft Idler	3-4	2 .0460 / .0470	.9840 / .9835
	Revolving Chain Idler.....	5-2	2 .0460 / .0470	.9840 / .9835
1-5483	Hoist Direct Drive Clutch.....	2-3	5 .3154 / .3166	3 .1501 / .1495
	Hoist Reverse Drive.....	2-5	5 .3154 / .3166	3 .1501 / .1495
	Countershaft Clutch.....	3-2	5 .3154 / .3166	3 .1501 / .1495
1-5744	Hoist Worm Shaft.....	1-3	3.999 / 4.000	
1-5745	Hoist Worm Shaft.....	1-3		1 .7515 / .7505
1-5771	Hoist Worm Shaft.....	1-3	3 .148 / .149	1 .5755 / .5745
1-5988	Hoist Worm Shaft.....	1-3	2.9995 / 3.0005	
1-5989	Hoist Worm Shaft.....	1-3		1 .7500 / .7495
152A-6005	Swivel Hook Block.....	6-3	3 .350 / .365	1 .500 / .497

13722-A

TABLE OF TOLERANCES FOR BEARINGS

BRONZE BEARINGS

Bearing Number	Location	Group Number	Housing Diameter	Shaft Diameter	Thickness	Bearing O.D.	Bearing I.D.
1-5673	Boom Point	6-2	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
	Bridle Sheave	6-4	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
	Lower Mast Housing	8-2	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
	Main Frame	12-1	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
	Sheave Frame	12-3	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
	Spare Parts	16-6	$1\frac{.874}{.875}$	$1\frac{.500}{.498}$		$1\frac{.878}{.876}$	$1\frac{.504}{.507}$
1-5762	Hoist Drum and Gear Housing	1-4	$2\frac{.996}{.999}$	$2\frac{.628}{.625}$		$3\frac{.002}{.001}$	$2\frac{.631}{.634}$

(Continued on Page 36)

BRONZE BEARINGS (Cont.)

Bearing Number	Location	Group Number	Housing Diameter	Shaft Diameter	Thickness	Bearing O.D.	Bearing I.D.
1-5764	Hoist Drum and Gear Housing..	1-4	$\frac{2.998}{3.001}$	$2\frac{.628}{.625}$		$3\frac{.002}{.001}$	$2\frac{.631}{.634}$
1-5766	Hoist Drum and Gear Housing..	1-4			$\frac{.252}{.248}$	$4\frac{.255}{.245}$	$2\frac{.630}{.634}$
PLT-576-1	Swivel Hook Block.....	6-3	$1\frac{.751}{.752}$	$1\frac{.250}{.247}$		$1\frac{.753}{.752}$	$1\frac{.256}{.257}$
	Spare Parts.....	16-6	$1\frac{.751}{.752}$	$1\frac{.250}{.247}$		$1\frac{.753}{.752}$	$1\frac{.256}{.257}$
151-612	Mast Column.....	8-1	$16\frac{3}{8} \pm \frac{1}{64}$	$12\frac{.108}{.107}$	$\frac{.375}{.374}$	$16 \pm \frac{1}{64}$	$12\frac{1}{8} + \frac{1}{32}$ $- 0$
151-679	Mast Column.....	8-1	$12\frac{.874}{.876}$	$12\frac{.108}{.107}$		$12\frac{.880}{.878}$	$12\frac{.125}{.126}$

SPARE PARTS CATALOG

– For –

MODEL CTD REVOLVING CRANE

Prepared for Mounting on

INTERNATIONAL HARVESTER COMPANY
Model TD-18 TracTracTor

INDEX

(Continued on next page)

INDEX

(Continued)

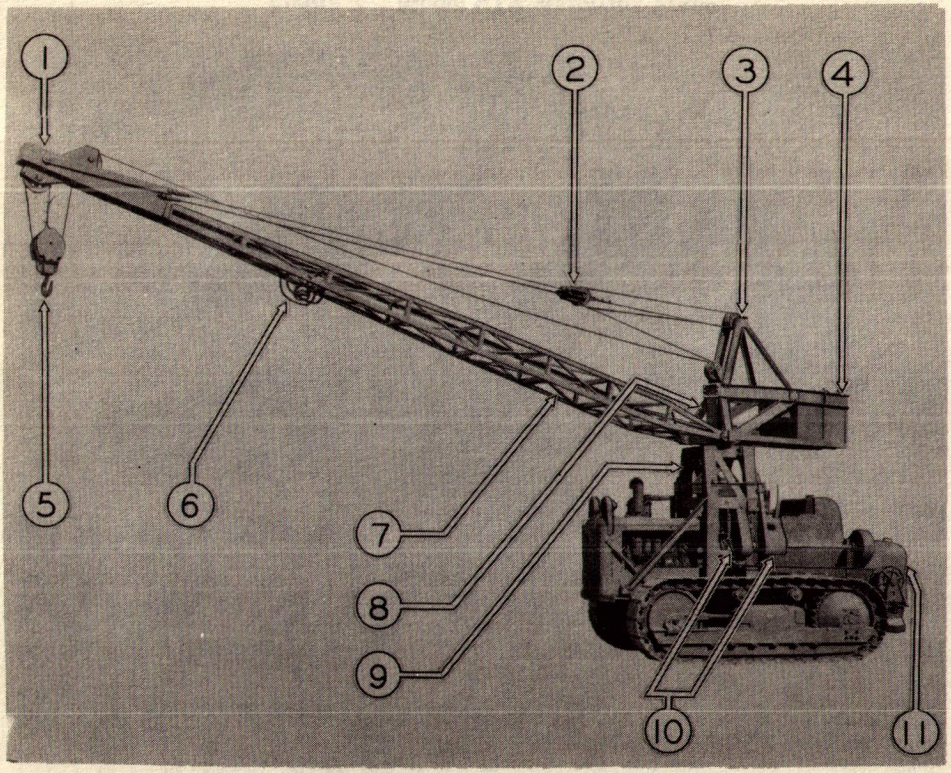

Figure 1 Model CTD Revolving Crane

Ref. No.	Name	Group No.
1	Boom Point.....	6-2
2	Bridle Sheave.....	6-4
3	Sheave Frame.....	12-3
4	Counterweight Frame...	12-2
5	Swivel Hook Block.....	6-3
6	Boom Light Bracket....	15-1
7	Boom Column.....	6-1
8	Mast Column.....	8-1
9	Main Frame.....	12-1
10	Revolving Drive Shields	16-2
11	Rear Shields.....	16-1
	Miscellaneous Parts Groups not represented within illustrations:	
	Tools	16-4
	Instruction Plates	16-5
	Spare Parts.....	16-6

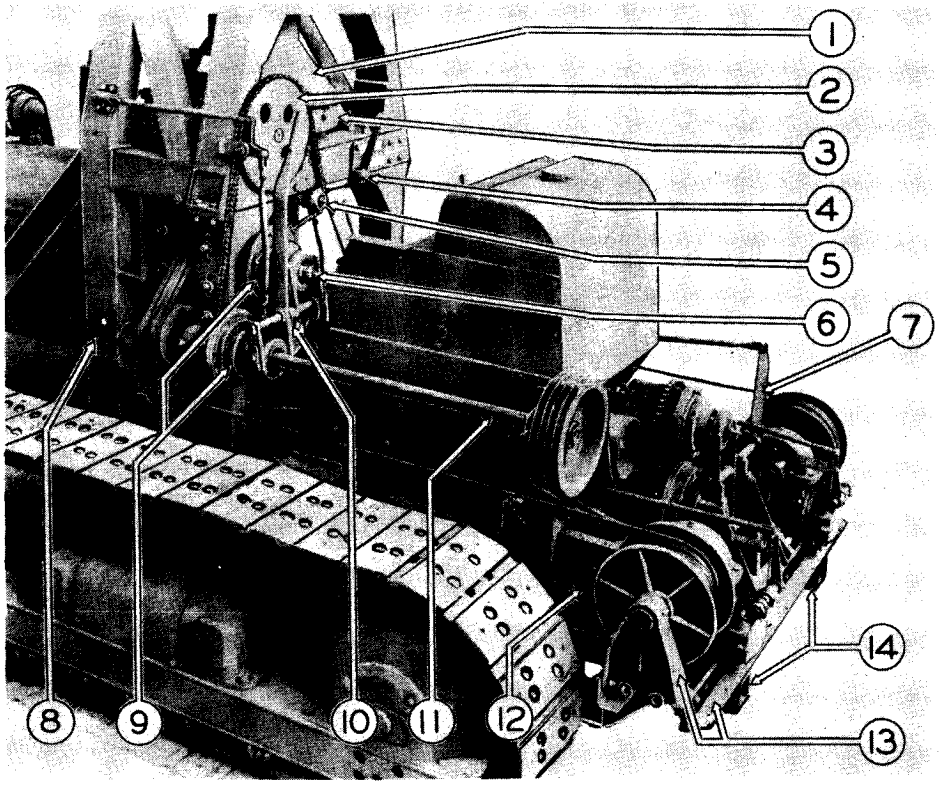

Figure 2 Model CTD Revolving Crane

Ref. No.	Name	Group No.
1	Mast Column.....	8-1
2	Mast Worm Shaft.....	8-3 8-4
3	Lower Mast Housing....	8-2
4	Engine Controls.....	9-1
5	Revolving Drive Idler...	5-2
6	Reverse Countershaft...	5-1
7	Power Takeoff Clutch Control	2-6
8	Main Frame	12-1
9	Countershaft Clutch....	3-2
10	Revolving Drive Control	3-3
11	Primary Countershaft..	3-1
12	Hoist Worm Shaft.....	1-3
13	Dual Hoist.....	1-2
14	Rear Brackets.....	12-4

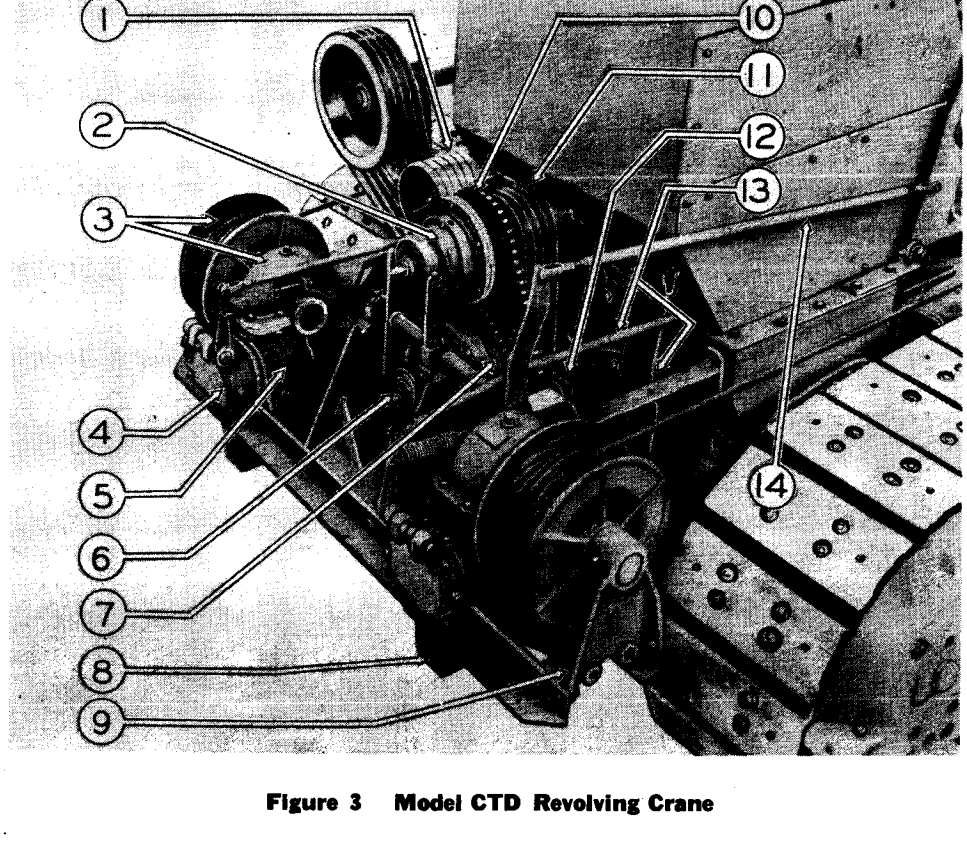

Figure 3 Model CTD Revolving Crane

Ref. No.	Name	Group No.
1	Countershaft Drive Belt Idler	3-4
2	Hoist Reverse Drive Clutch	2-5
3	Hoist Drum and Gear Housing	1-4
4	Hoist Brake	1-5
5	Hoist Worm Shaft	1-3
6	Hoist Direct Drive Clutch	2-3
7	Hoist Direct Drive	2-2
8	Rear Brackets	12-4
9	Dual Hoist	1-2
10	Hoist Reverse Drive	2-4
11	Power Takeoff Belt Drive	2-1
12	Hoist Drive Chain Idler	1-6
13	Hoist Controls	1-1
14	Power Takeoff Clutch Control	2-6

INDEX TO ASSEMBLY PARTS LIST

INDEX TO ASSEMBLY PARTS LIST
(Continued)

HOIST CONTROLS

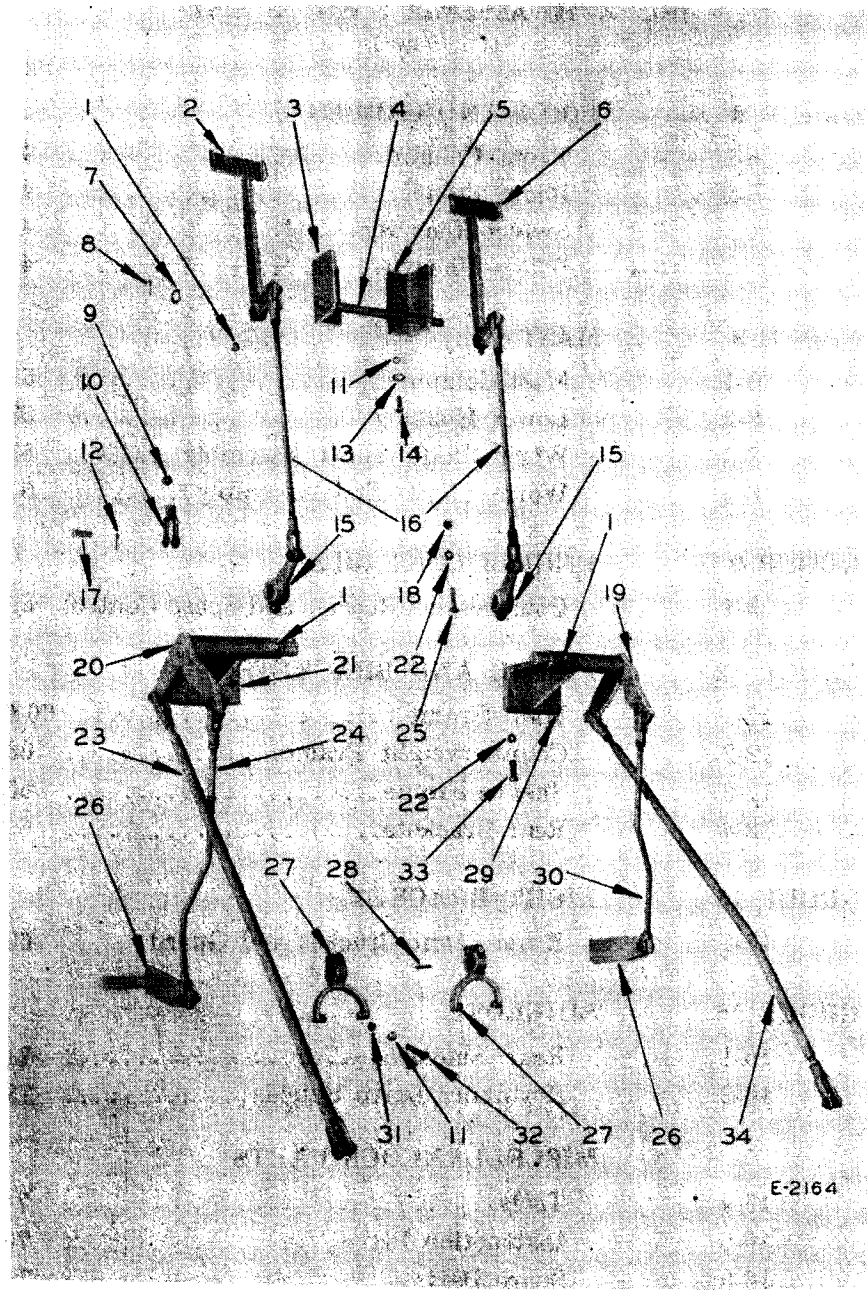

Figure 4 Hoist Controls

HOIST CONTROLS

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 4	.....	Hoist Controls Group.....	1
1	1-443	Fitting–Grease–No. 1612 Alemite–Stewart-Warner Corp.....	4
2	178-159	Pedal–Foot	1
3	178-197	Bracket–For Foot Pedal.....	1
4	178-162	Shaft–For Pedals.....	1
5	178-195	Bracket–For Foot Pedal.....	1
6	178-161	Pedal–Foot	1
7	.....	Bushing–Machinery–¾"	2
8	.....	Cotter Pin–⅛"x1".....	2
9	.....	Nut–Jam–½"–20 N F.....	10
10	5-2671	Clevis–For Links.....	10
11	.....	Lockwasher–⅜"	6
12	.....	Cotter Pin–⅛"x⅞".....	12
13	.....	Washer–Plain–5/16"	4
14	.....	Capscrew–⅜"–16x1¼" N C.....	4
15	178-153	Lever	2
16	129-547	Link	2
17	KL-367	Pin–Clevis	12
18	.....	Nut–½"–20 N F.....	2
19	178-151	Lever	1
20	178-147	Lever	1
21	178-157	Bracket–For Levers.....	1
22	.....	Lockwasher–½"	6
23	104-1458	Link	1
24	178-155	Link	1
25	.....	Capscrew–½"–20x2½" N F.....	2
26	152-161	Lever–For Shifter Fork.....	2
27	1-5689	Fork–Shifter–ADK-143–Braden Winch Co.....	2
28	1-5690	Key–20-192A Braden Winch Co.....	2
29	178-145	Bracket–For Levers	1
30	178-152	Link	1
31	.....	Nut–⅜"–24 N F.....	2
32	.....	Capscrew–⅜"–24x2¼" N F.....	2
33	.....	Capscrew–½"-13x1½" NC	4
34	178-154	Link	1

DUAL HOIST

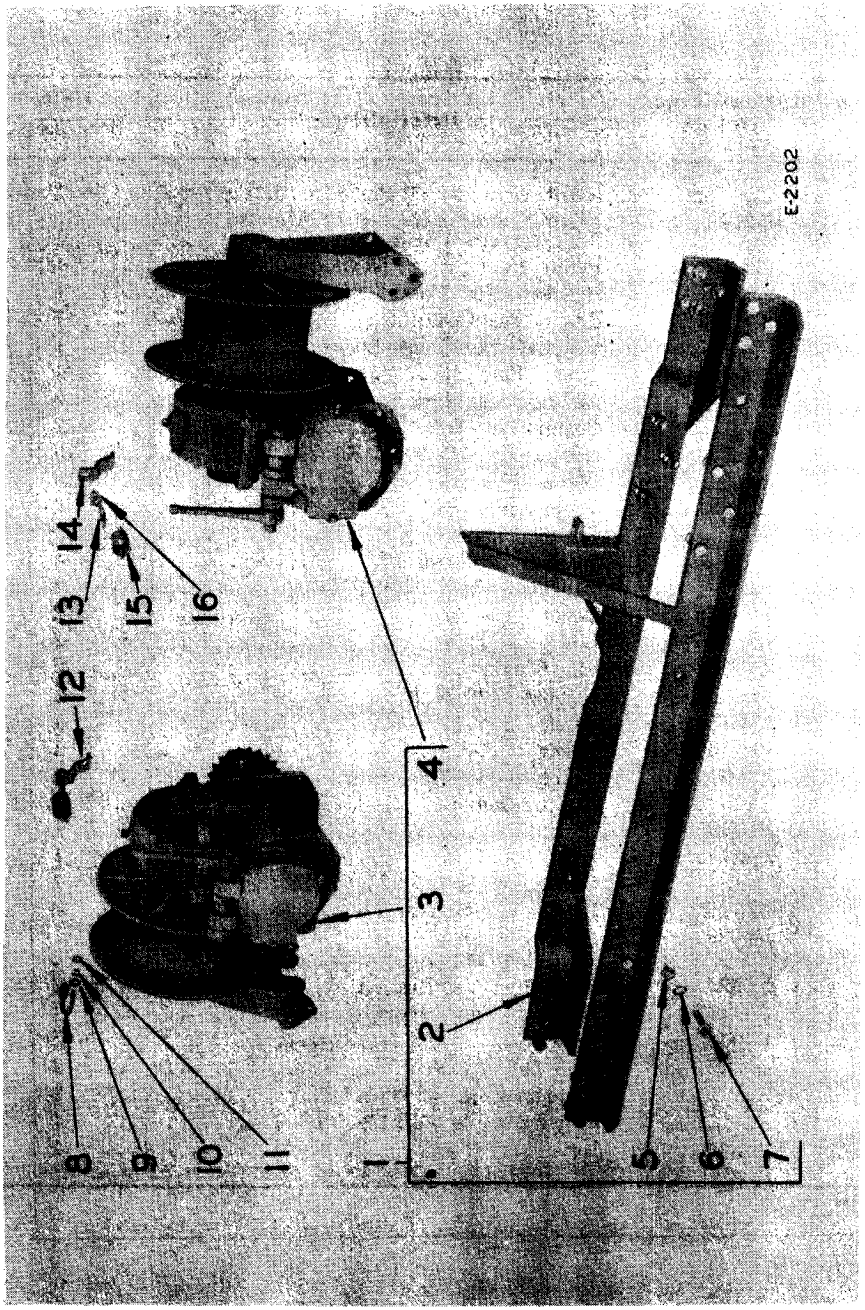

Figure 5 Dual Hoist

Fig & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig. 5	178A-1002	Dual Hoist Assembly Complete	1
1	178A-1001	Hoist–Dual Assembly–Consisting of– See Groups 1-3, 1-4 and 1-5	1
2	1-7324	Frame–For Dual Hoist– M12TD18-146–Braden Winch Co	1
3	1-7323	Hoist Assembly–Left Hand– M12TD18L-0–Braden Winch Co See Groups 1-3, 1-4 and 1-5	1
4	1-7322	Hoist Assembly–Right Hand– M12TD18R-0–Braden Winch Co See Groups 1-3, 1-4 and 1-5	1
5	.....	Nut–5/8"–18 N F	24
6	.....	Lockwasher–5/8"	24
7	.....	Capscrew–5/8"–18x2" N F	24
8	178-3625	U-Bolt–For Cable	2
9	.....	Washer–Plain–3/8"	4
10	.....	Lockwasher–7/16"	4
11	.....	Nut–7/16"–14 N C	4
12	166-1641	Bracket–For Spring	1
13	35-971	Eye-Bolt	2
14	166-1642	Bracket–For Spring	1
15	121-989	Spring–For Lever	2
16	.....	Nut–Jam–1/2"–13 N C	4

HOIST WORM SHAFT

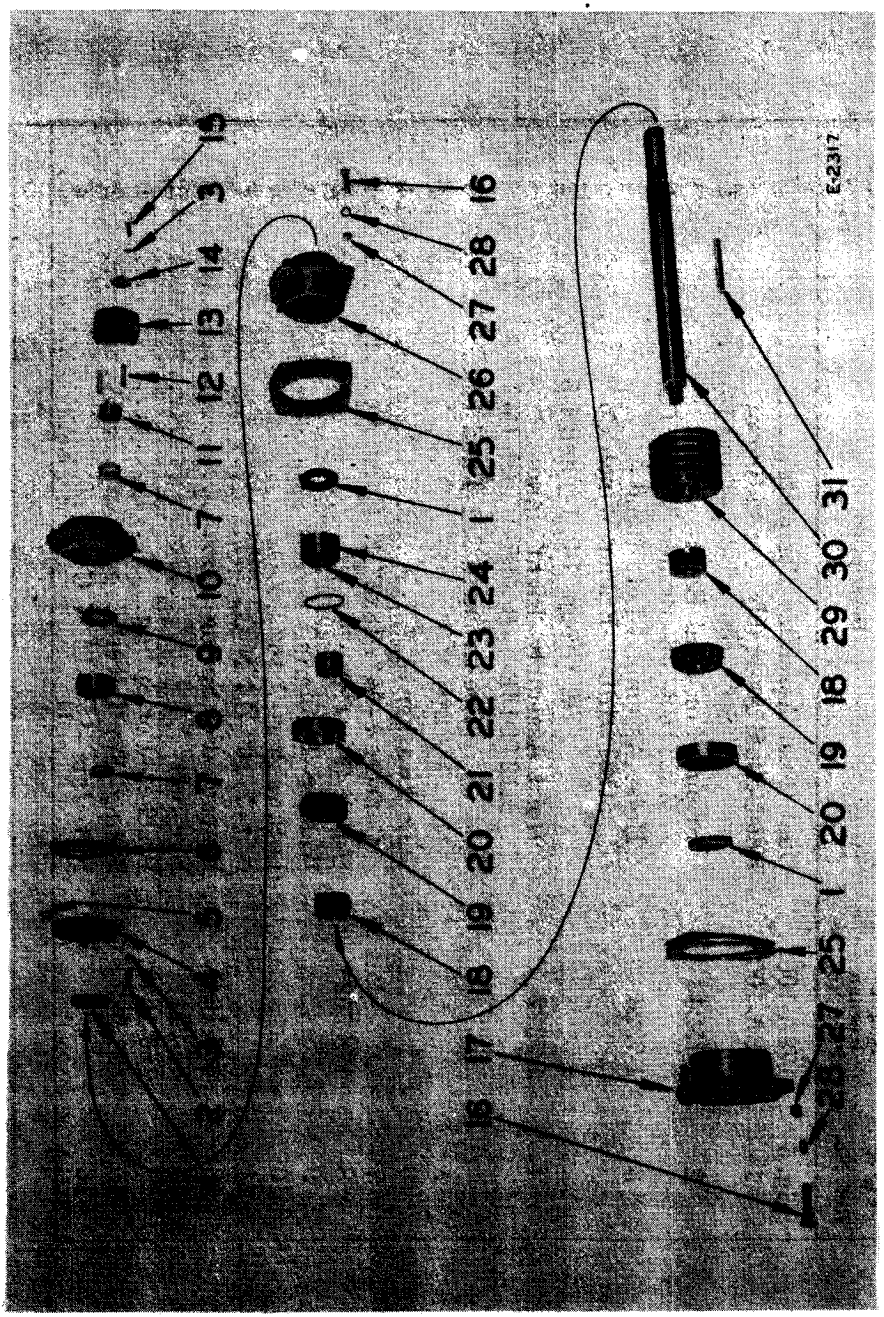

Figure 6 Hoist Worm Shaft

HOIST WORM SHAFT

Fig & Ref. No.	Hughes-Keenan Part No.	Braden Winch Co. Part No.	Description	Units Per Assy.
Fig. 6	.....	.....	Hoist Worm Shaft Group	1
1	1-5740	A-249A	Seal—Oil	3
2	.....	.....	Capscrew—⅜"—24x1½" N F	4
3	.....	.....	Lockwasher—⅜"	5
4	1-5759	M12K6D-122B	Retainer—Bearing	1
5	1-442	.....	Fitting—Grease—No. 1610 Alemite—Stewart-Warner Corp.	1
6	1-5758	M12K6D-122G	Gasket—Bearing Retainer	2
7	1-5756	M12K6D-122S	Shim—Adjusting	8
8	1-5771	M12K6D-122C	Bearing—Sprocket	1
9	1-5757	B-149A	Seal—Oil	1
10	1-6219	ADK-222	Sprocket—Worm	1
11	1-5755	M12K6D-122A	Spacer—Bearing Sprocket	1
12	1-5754	MU-141A	Key—Clutch	2
13	1-6218	ADK-241	Clutch—Worm Shaft	1
14	1-5753	2H-106W	Washer—Clutch Retaining	1
15	.....	.....	Capscrew—⅜"—24x1¼" N F	1
16	.....	.....	Capscrew—½"—20x2" N F	8
17	1-5990	M12K6D-649	Container—Bearing	1
18	1-5746	M12K6D-102S	Spacer—Bearing	2
19	1-5745	C-103A	Cone Bearing	2
20	1-5744	C-203B	Cup—Bearing	2
21	1-5993	M12K6D-105A	Spacer—Radial Bearing	1
22	1-5997	M12K6D-104S	Ring—Radial Bearing Snap	1
23	1-5989	M12K6D-104B	Race—Inner Bearing	1
24	1-5988	M12K6D-104A	Race—Outer Bearing	1
25	1-5733	M12-149G	Gasket—Bearing Container	4
26	1-5991	M12K6D-249	Container—Bearing	1
27	.....	.....	Nut—½"—20 N F	8
28	.....	.....	Lockwasher—½"	8
29	1-5747	M12-100L	Worm	1
30	1-5994	M12K6D-202	Shaft—Worm	1
31	1-5763	LA-100A	Key—Worm	1

NOTE—Above parts are for Left Hand Assembly only. Double the quantity shown under "Units per Assembly" for complete machine.

HOIST DRUM AND GEAR HOUSING

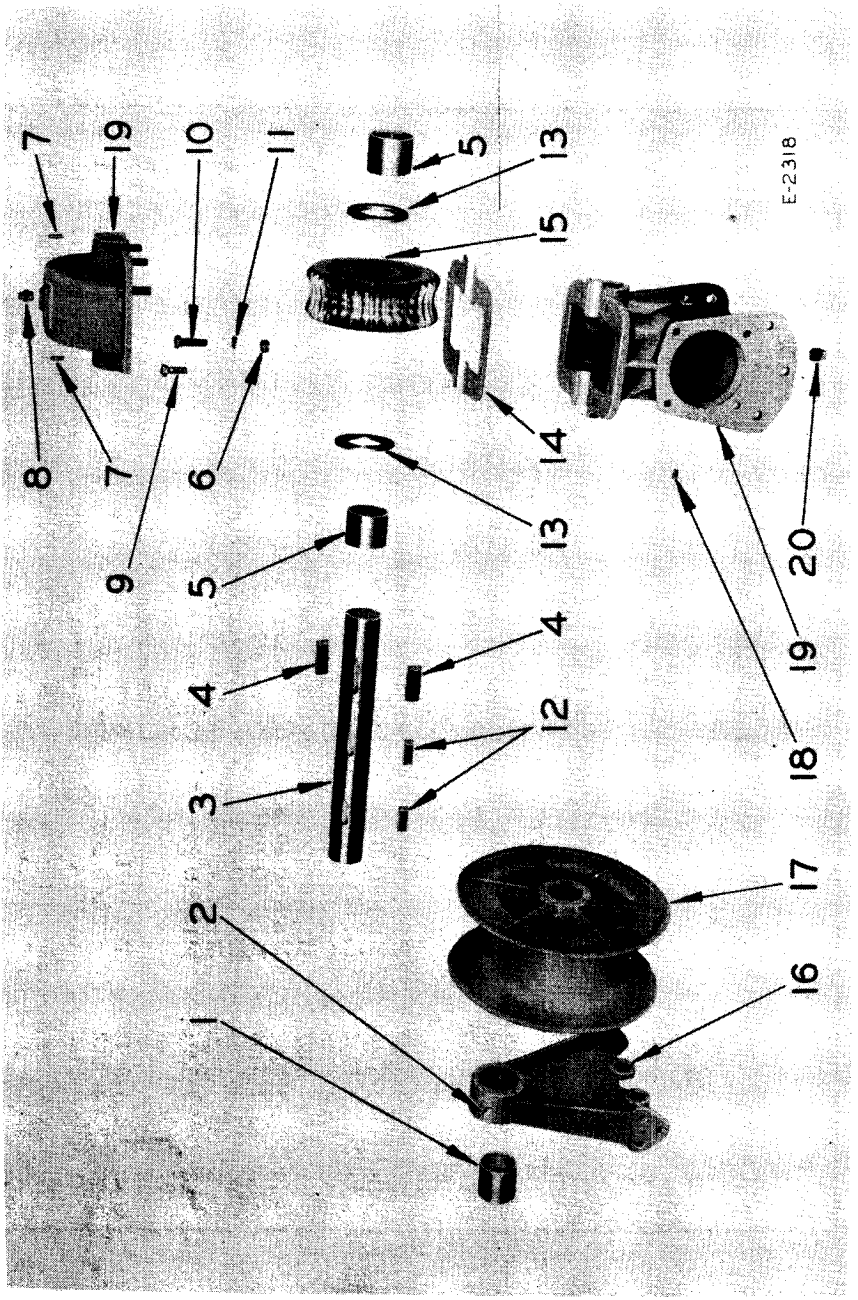

Figure 7 Hoist Drum And Gear Housing

Fig & Ref. No.	Hughes-Keenan Part No.	Braden Winch Co. Part No.	Description	Units Per Assy.
Fig. 7	.....	.....	Hoist Drum and Gear Housing Group	1
1	1-5762	C-133B	Bushing–For Bearing Leg.....	1
2	1-443	.....	Fitting–Grease–No. 1612 Alemite–Stewart-Warner Corp.....	1
3	1-5770	M12K6D-136	Shaft–Cable Drum.....	1
4	1-5731	C-241A	Key–Worm Gear.....	2
5	1-5764	C-134B	Bushing–Worm Housing.....	2
6	.....	.....	Nut–½"–20 N F.....	8
7	1-5765	20-134D	Dowel–Bushing	2
8	1-5768	20-E116H	Plug–Vented Pipe.....	1
9	.....	.....	Bolt–Cover–½"–20x1¾" N F.....	5
10	.....	.....	Bolt–Cover–½"–20x2¼" N F.....	3
11	.....	.....	Lockwasher–½"	8
12	1-5769	CDK-135A	Key–Cable Drum Shaft.....	2
13	1-5766	M12-134A	Washer–Worm Gear Thrust.....	2
14	1-5732	M12-144G	Gasket–Worm Housing Cover.....	2
15	1-5767	M12-101L	Gear–Worm	1
16	1-7321	M12TD18-132-0	Bearing Leg and Bushing.....	1
17	1-5751	CDK-135	Drum–Cable	1
18	1-363	.....	Plug–Level–⅛"	2
19	1-5760	M12-134-0	Worm Housing and Cover.....	1
20	1-366	.....	Plug–Drain–½"	1

NOTE–The above parts are for Left Hand Assembly only. Parts for Right Hand Hoist Assembly are arranged opposite to those shown in Figure 7. Double the quantity shown under "Units Per Assembly" for complete machine.

HOIST BRAKE

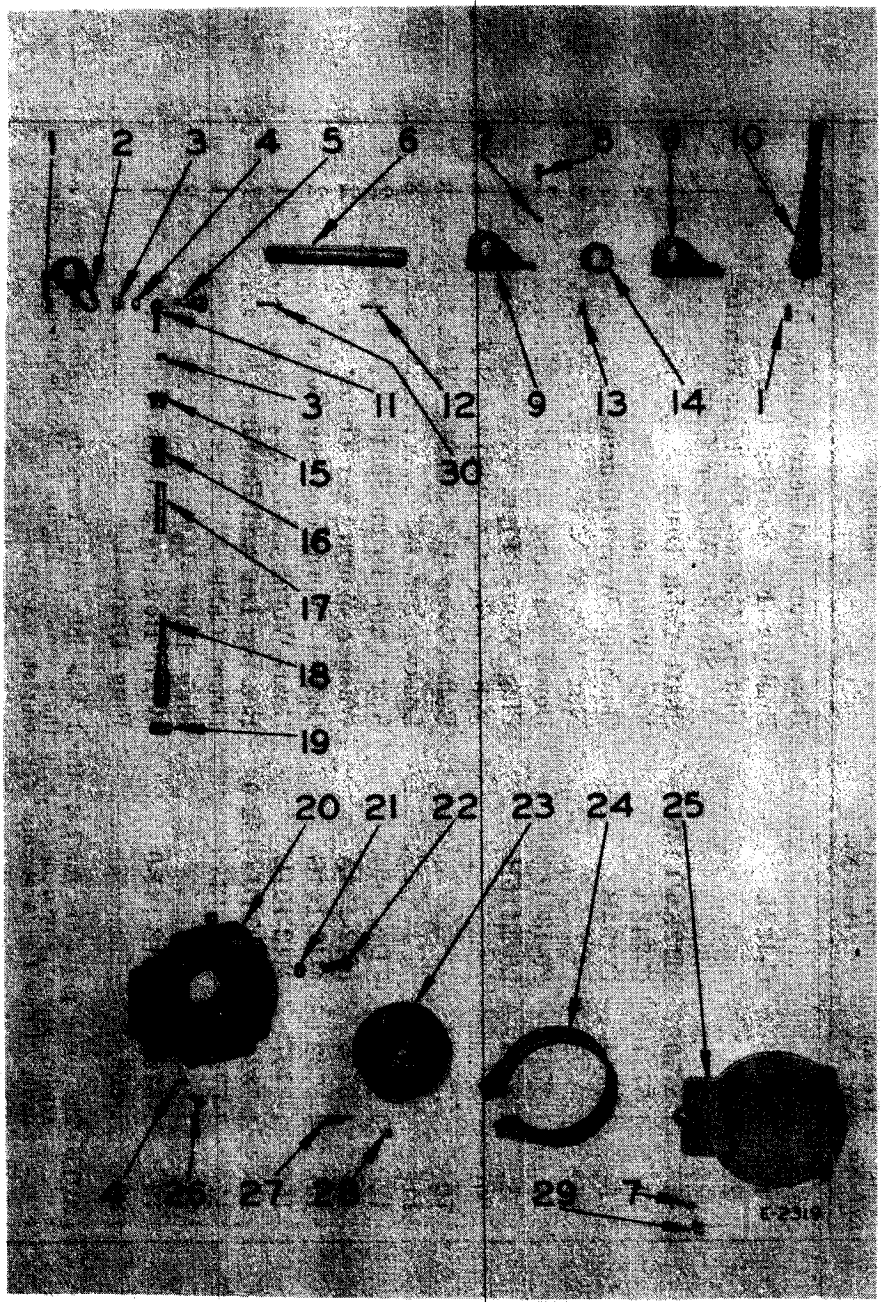

Figure 8 Hoist Brake

13418-A

HOIST BRAKE

Fig. & Ref. No.	Hughes-Keenan Part No.	Braden Winch Co. Part No.	Description	Units Per Assy.
Fig. 8	.....	.....	Hoist Brake Group	1
1	.....	.....	Setscrew–Sq. Hd.–⅜"–16x⅝" N C	2
2	1-5726	B-162	Lever–Brake–Short	1
3	.....	.....	Nut–⅜"–24 N F	2
4	.....	.....	Lockwasher–⅜"	7
5	1-5727	M211A	Bolt–Pivot	1
6	1-5729	A-563	Shaft–Brake	1
7	.....	.....	Lockwasher–5/16"	5
8	.....	.....	Capscrew–5/16"–18x¾" N C	2
9	1-5730	A-563B	Bracket–Brake Shaft	2
10	1-5725	81-292L	Lever–Brake–Long	1
11	1-5724	4114	Eye Bolt–Brake	1
12	1-5690	20-192A	Key–Brake Lever	1
13	.....	.....	Setscrew–Sq. Hd.–5/16"–18x⅝" N C	1
14	1-5728	B-194	Collar–Brake Shaft Thrust	1
15	1-5723	M12K6D-557	Retainer–Brake Spring	1
16	1-5721	20-556	Spring–Brake	1
17	1-5722	M12K6D-561	Rod–Brake Release	1
18	1-5718	M12K6D-555	Anchor–Brake Adjusting	1
19	1-5719	20-558	Nut–Brake Adjusting Anchor	1
20	1-5720	M12K6D-548	Housing–Brake	1
21	.....	.....	Nut–½"–20 N F	2
22	.....	.....	Capscrew–½"–20x1¼" N F	2
23	1-5368	A-551	Drum–Brake	1
24	1-5735	20-652-0	Brake Band Assy.–Including service parts:	1
	1-5736	20-553	Lining–Brake	1
	1-5737	20-553R	Rivet–For Lining	6
25	1-5738	20-650	Cover–Brake Housing	1
26	.....	.....	Capscrew–⅜"–16x1¼" N C	6
27	.....	.....	Setscrew–Sq. Hd.–⅜"–16x⅞" N C	1
28	1-5739	B-118A	Key–Brake Drum	1
29	.....	.....	Capscrew–5/16"–18x1" N C	3
30	1-7320	M12K6D-162A	Key–Brake Lever	1

NOTE–The above parts are for left Hand Assembly only. Parts for Right Hand Brake Assembly are arranged opposite to those shown in Figure 8. Double the quantity shown under "Units Per Assembly" for complete machine.

HOIST DRIVE CHAIN IDLER

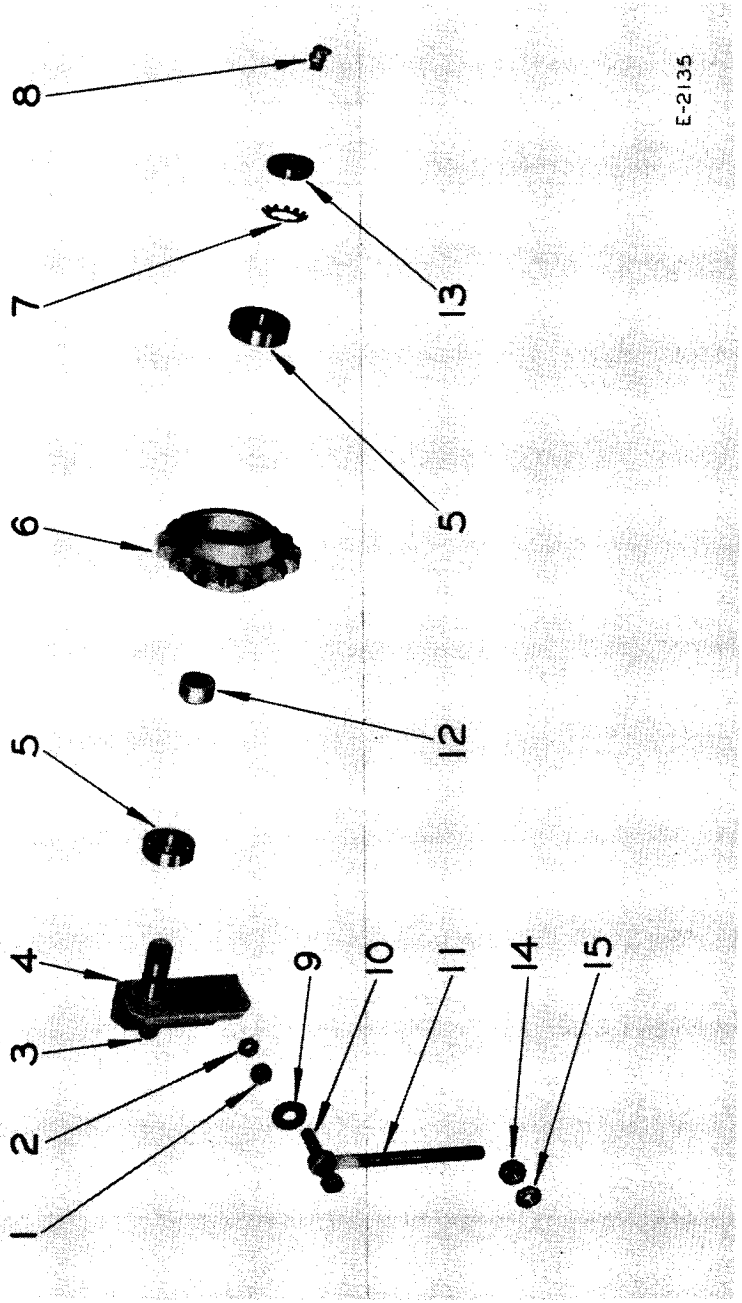

Figure 9 Hoist Drive Chain Idler

HOIST DRIVE CHAIN IDLER

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 9	151A-1001	Hoist Drive Chain Idler Group Assembly	1
1	.....	Nut–½"–20 N F	2
2	.....	Nut–Jam–½"–20 N F	2
3	.....	Capscrew–½"–20 x 1¾" N F	1
4	151-195	Bracket–Idler	1
5	1-5239	Bearing–For Idler Sprocket 6205RS–SKF Industries, Inc	2
6	151-137	Sprocket–Idler	1
7	1-5353	Lockwasher–For Idler Shaft W–05 SKF Industries, Inc	1
8	1-443	Fitting–Grease–No. 1612 Alemite Stewart-Warner Corp	1
9	.....	Washer–Plain–½"	1
10	.....	Capscrew–½"–20 x 2¾" N F	1
11	PG-757	Bolt–Adjustment	1
12	151-188	Spacer–For Bearings	1
13	1-5352	Locknut–For Idler Shaft N-05 SKF Industries, Inc	1
14	.....	Nut–½"–13 N C	1
15	.....	Nut–Jam–½"–13 N C	1

POWER TAKEOFF BELT DRIVE

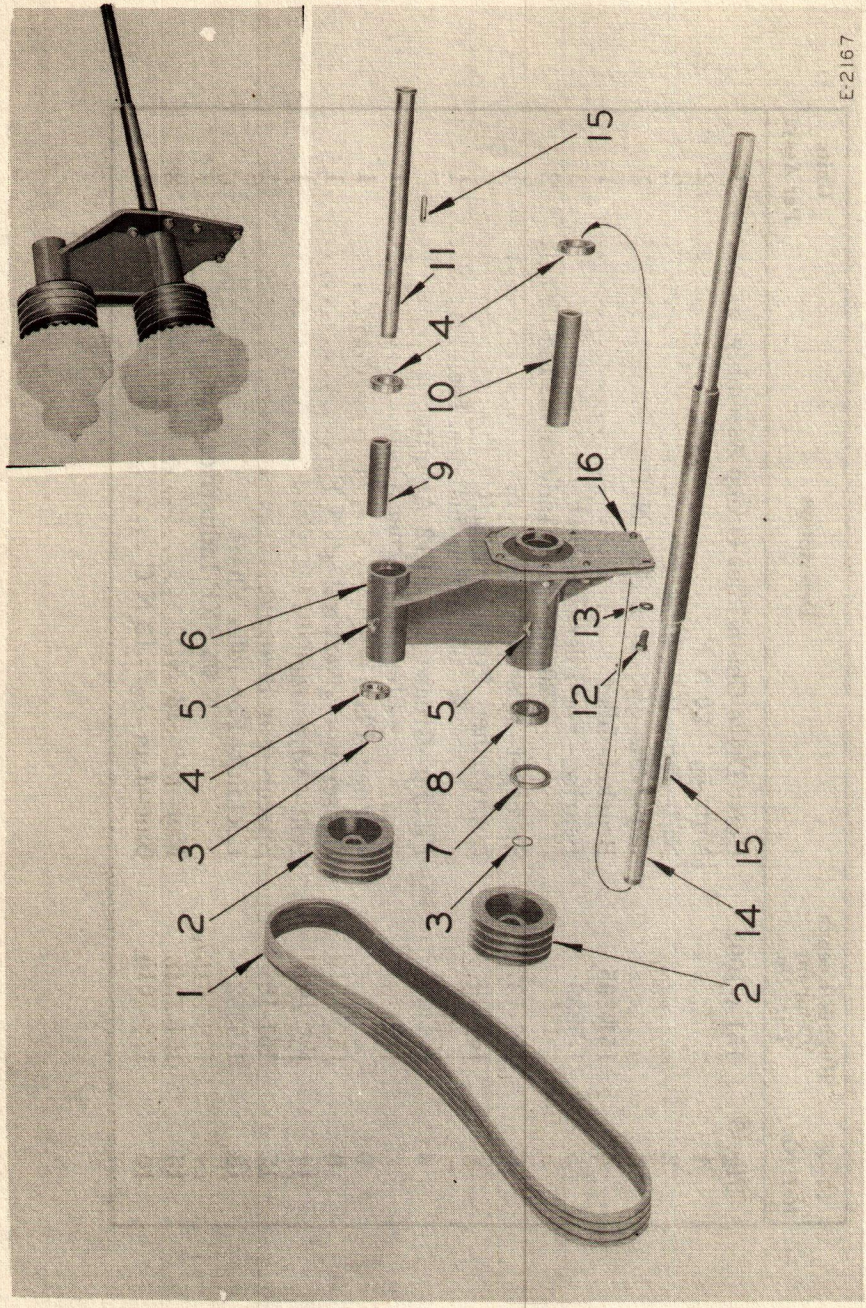

Figure 10 Power Takeoff Belt Drive

POWER TAKEOFF BELT DRIVE

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 10	.....	Power Takeoff Belt Drive Group.....	1
1	1-6637	Belt No. C-120–Dayton Rubber Co.....	4
2	151-6507	Sheave	2
3	21-1521	Spacer–For Bearing.....	2
4	1-4935	Bearing No. 6209RS–SKF Industries, Inc.....	3
5	1-4989	Fitting–Grease–No. 1799 Measuring Fitting with No. 1637 Grease Fitting Stewart-Warner Corp.....	2
6	178-1512	Housing–Power Takeoff Belt Drive.....	1
7	1-455	Seal–Oil No. 4003–Chicago Rawhide Co.....	1
8	1-5238	Bearing No. 6309–SKF Industries Corp.....	1
9	152-1519	Sleeve–For Bearings.....	1
10	178-1519	Sleeve–For Bearings.....	1
11	152-408	Shaft	1
12	.....	Capscrew–$\frac{3}{4}$"–10 x 1$\frac{1}{2}$" N C.....	6
13	.....	Lockwasher–$\frac{3}{4}$"	6
14	178-1515A	Shaft	1
15	151-1518	Key–For Sheave.....	2
16	178-1015	Gasket	1

HOIST DIRECT DRIVE

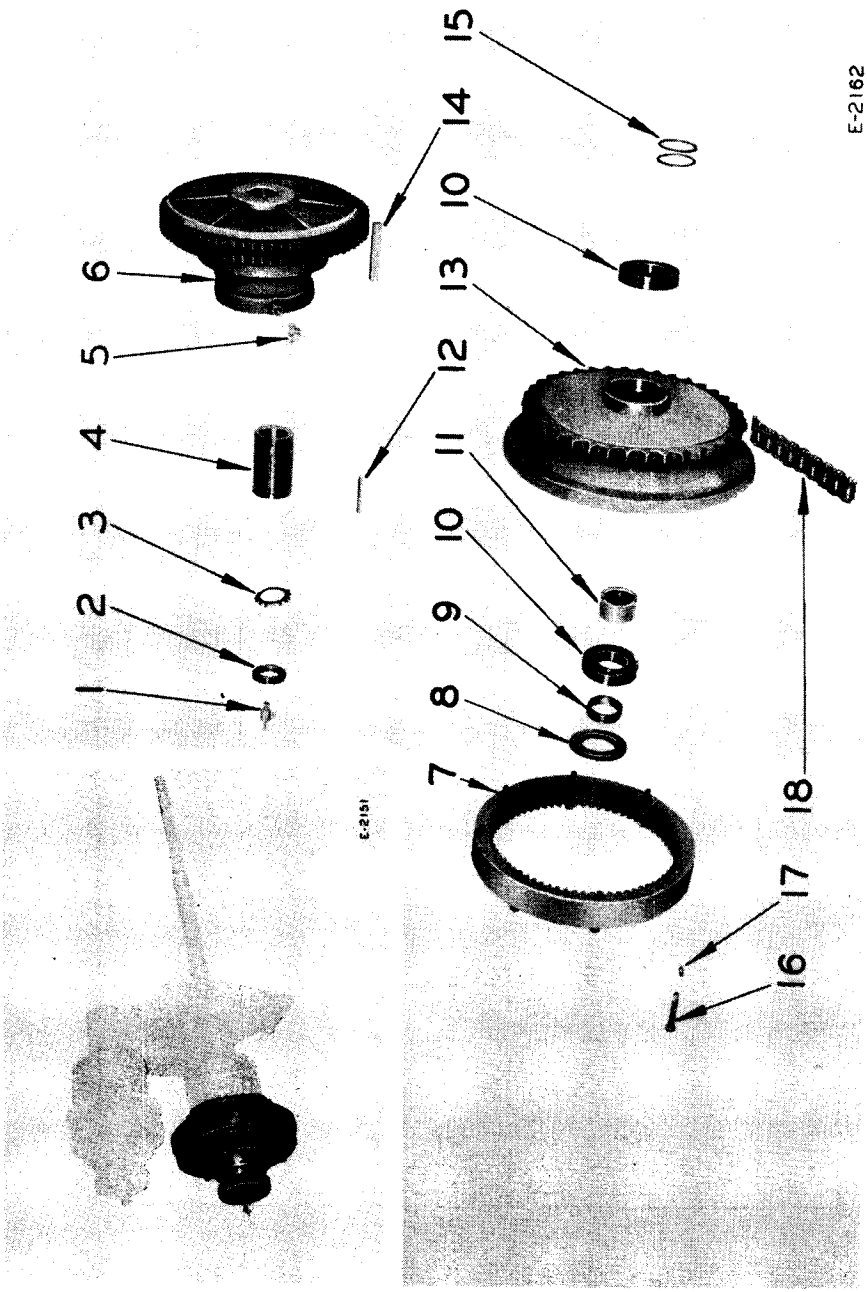

Figure 11 Hoist Direct Drive

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 11	.....	Hoist Direct Drive Group.....	1
1	1-4989	Fitting–Grease–No. 1799 Measuring Fitting with No. 1637 Grease Fitting– Stewart-Warner Corp.....	1
2	1-67	Locknut–For Clutch– N-08–SKF Industries, Inc.....	1
3	1-68	Lockwasher–For Clutch– W-08–SKF Industries, Inc.....	1
4	151-1513	Sleeve–For Clutch.....	1
5	1-443	Fitting–Grease–No. 1612 Alemite– Stewart-Warner Corp.....	1
6	1-6169	Hoist Direct Drive Clutch Assembly– See Group 2-3.....	1
7	1-1534	Ring–Driving– 6931–Twin Disc Clutch Co.....	1
8	1-1266	Seal–Oil No. 1315–Garlock Packing Co.....	1
9	21-1525	Spacer–For Bearing.....	1
10	1-4935	Bearing No. 6209RS–SKF Industries, Inc....	2
11	21-1519	Spacer–For Bearings.....	1
12	24-1143	Key–For Clutch.....	1
13	178-1517	Sprocket and Hub.....	1
14	21-1518A	Key–For Clutch.....	1
15	152-1516	Spacer–For Bearing..... Note: Use at least one spacer for protection of the bearing seal, but establish correct sprocket alignment by using more spacers as needed.	2
16	.....	Capscrew–$\frac{3}{8}$"–16 x 2$\frac{1}{2}$" N C.....	8
17	.....	Lockwasher–$\frac{3}{8}$"	8
18	178-1431	Chain	1

HOIST DIRECT DRIVE CLUTCH

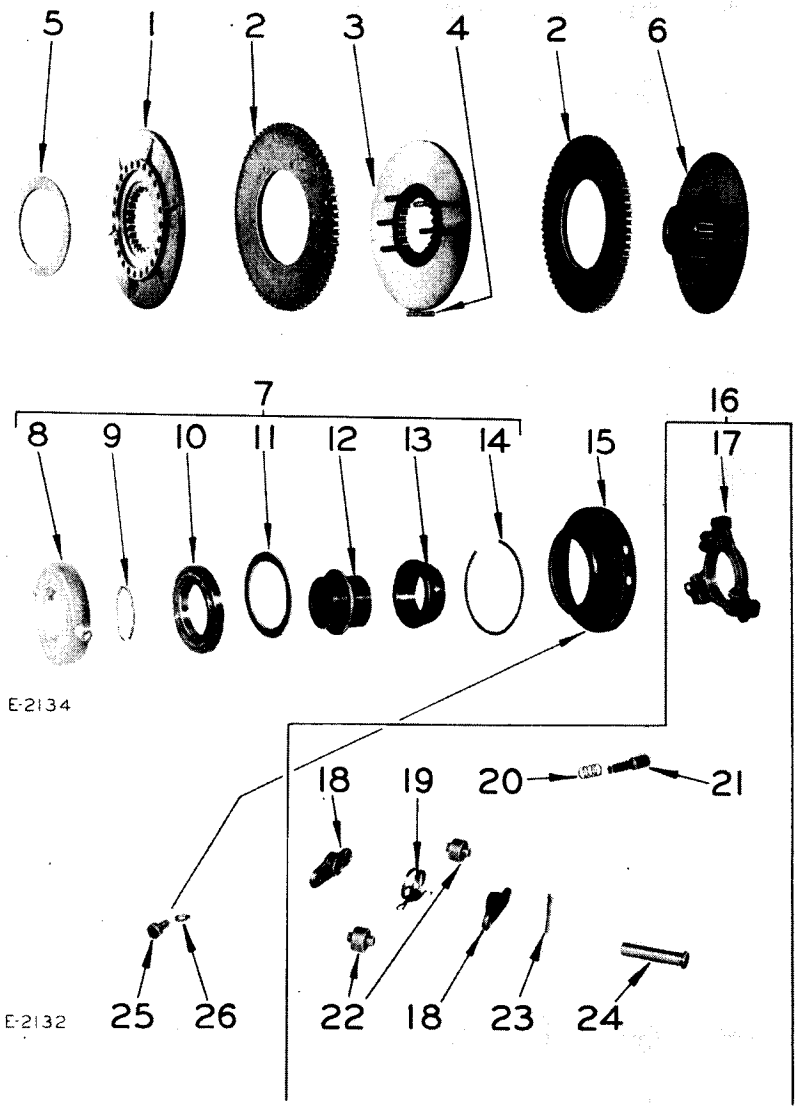

Figure 12 Hoist Direct Drive Clutch

HOIST DIRECT DRIVE CLUTCH

Fig. & Ref. No.	Hughes-Keenan Part No.	Twin Disc Clutch Co. Part No.	Description	Units Per Assy.
Fig. 12	1-6169	CL-211	Hoist Direct Drive Clutch Assembly—Specification No. 18211—Twin Disc Clutch Co.	1
1	1-6293	A5482B	Floating Plate	1
2	1-5496	06310JH	Driving Plate Assembly—Consisting of:	2
	1-5497	6310J	Driving Plate	1
	1-5498	A5223H	Friction Discs	2
	1-1522	M-116	Rivets—Tubular NOTE: Above parts are for one assembly only.	24
3	1-1524	5273	Center Plate	1
4	1-1525	1930A	Springs—Release	6
5	1-5493	A3649	Roller Disc	1
6	1-5495	6498AN	Hub and Back Plate	1
7	1-5479	C-334	Cone Assembly—Consisting of:	1
8	1-5482	4852	Collar—Cone	1
9	1-3703	A1688	Ring—Snap	1
10	1-5483	M-281	Bearing	1
11	1-5485	A1366	Washer	1
12	1-5480	A3552	Sleeve—Cone	1
13	1-5481	A3469	Ring—Cone	1
14	1-5484	A1016	Ring—Snap	1
15	1-6165	A-3762	Cover	1
16	1-6161	A-167	Adjusting Yoke Assembly—Consisting of:	1
17	1-6162	A3747	Yoke—Adjusting	1
18	1-5473	A3470	Lever	6
19	1-5478	A2603	Spring—Lever	3
20	1-830	1382	Spring—Lock Pin	1
21	1-829	A1683	Lock Pin—Adjusting	1
22	1-5475	A2234	Roller	6
23	1-812	105	Cotter Pin	3
24	1-5474	A2356	Pin—Lever	3
25	1-5492	M-276	Capscrew	3
26	1-833	M-101	Lockwasher	3

HOIST REVERSE DRIVE

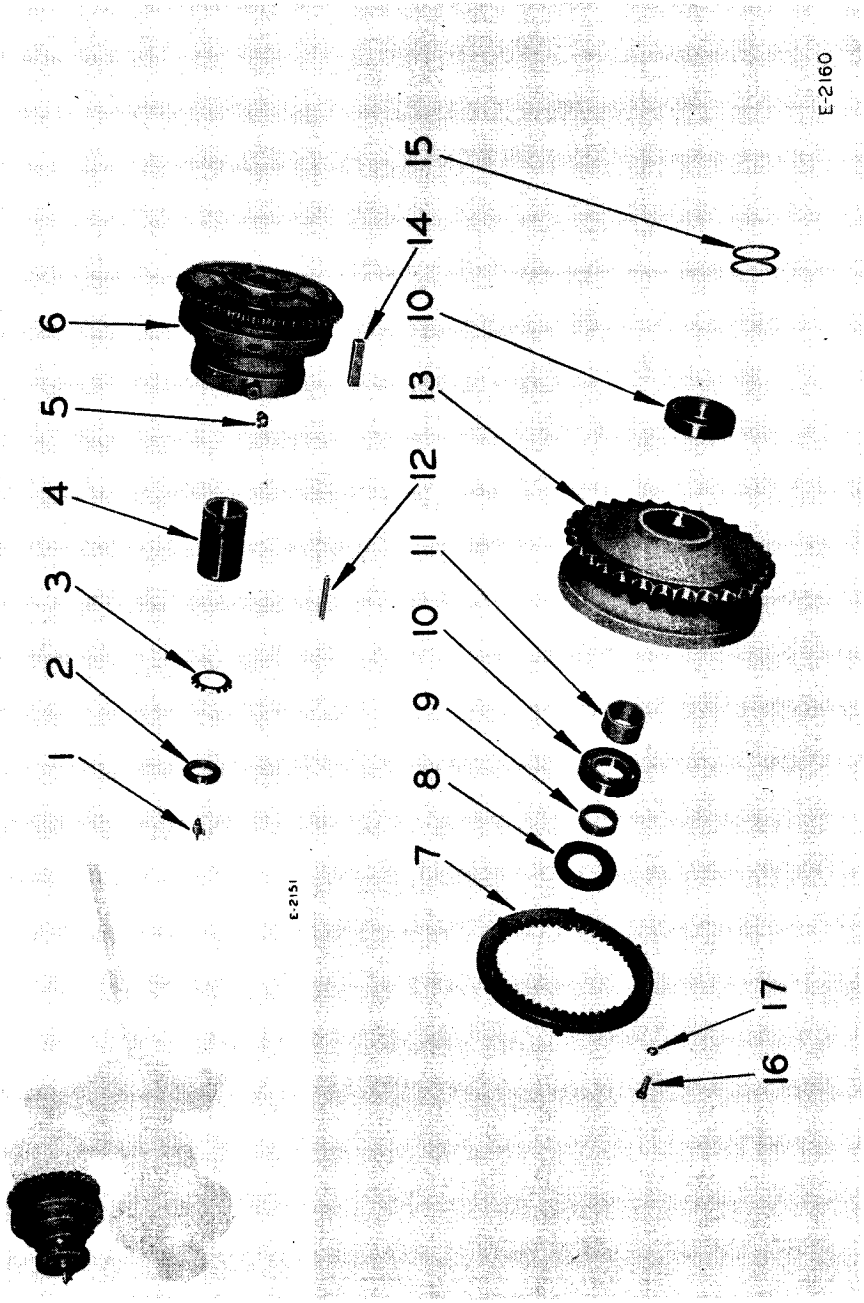

Figure 13 Hoist Reverse Drive

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 13	.....	Hoist Reverse Drive Group.....	1
1	1-4989	Fitting–Grease–No. 1799 Measuring Fitting with No. 1637 Grease Fitting–Stewart-Warner Corp.....	1
2	1-67	Locknut–For Clutch–N-08–SKF Industries, Inc.....	1
3	1-68	Lockwasher–For Clutch–W-08–SKF Industries, Inc.....	1
4	151-1513	Sleeve–For Clutch.....	1
5	1-443	Fitting–Grease–No. 1612 Alemite–Stewart-Warner Corp.....	1
6	1-6166	Clutch–Hoist Reverse Drive–See Group 2-5.....	1
7	151-416	Ring–Driving	1
8	1-1266	Seal–Oil–1315–Garlock Packing Co.....	1
9	21-1525	Spacer–For Bearing.....	1
10	1-4935	Bearing–For Sprocket and Hub–6209RS–SKF Industries, Inc.....	2
11	21-1519	Spacer–For Bearings	1
12	24-1143	Key–For Sleeve	1
13	178-422	Sprocket and Hub.....	1
14	2RL-731	Key–For Clutch.....	1
15	152-1516	Spacer–For Sprocket and Hub..... Note: Use at least one spacer for protection of the bearing seal, but establish correct sprocket alignment by using more spacers as needed.	1
16	.....	Capscrew–$\frac{3}{8}$"–16x1" N C.....	6
17	.....	Lockwasher–$\frac{3}{8}$"	6

HOIST REVERSE DRIVE CLUTCH

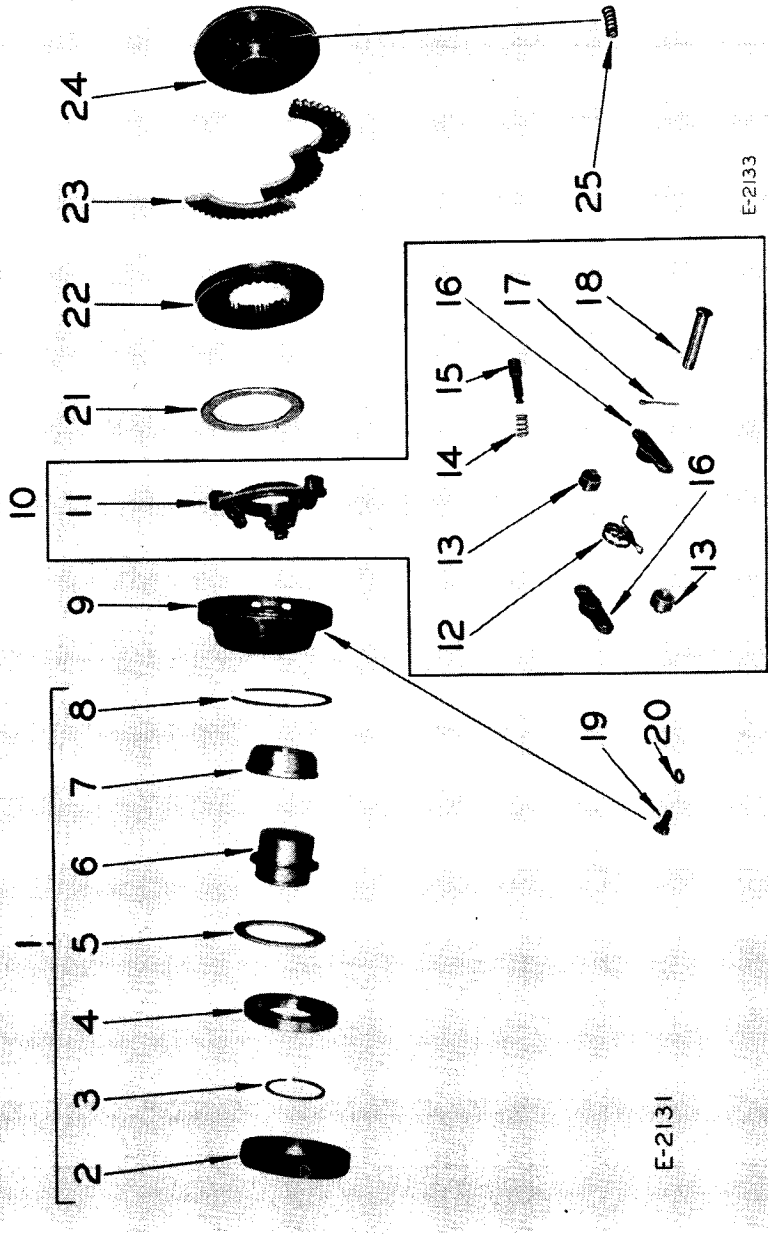

Figure 14 Hoist Reverse Drive Clutch

HOIST REVERSE DRIVE CLUTCH

Fig. & Ref. No.	Hughes-Keenan Part No.	Twin Disc Clutch Co. Part No.	Description	Units Per Assy.
Fig. 14	1-6166	CL-108	Reverse Drive Clutch Assembly Specification No. 18206—Twin Disc Clutch Co.	1
1	1-5479	C-334	Cone Assembly—Consisting of:	1
2	1-5482	4852	Cone Collar	1
3	1-3703	A-1688	Snap Ring	1
4	1-5483	M-281	Bearing	1
5	1-5485	A-1366	Washer	1
6	1-5480	A-3552	Cone Sleeve	1
7	1-5481	A-3469	Cone Ring	1
8	1-5484	A-1016	Snap Ring	1
9	1-6165	A-3762	Cover	1
10	1-6161	A-167	Adjusting Yoke Assembly—Consisting of:	1
11	1-6162	A-3747	Adjusting Yoke	1
12	1-5478	A-2603	Spring—Lever	3
13	1-5475	A-2234	Rollers	6
14	1-830	1382	Spring—Lock Pin	1
15	1-829	A-1683	Lock Pin	1
16	1-5473	A-3470	Lever	6
17	1-812	105	Cotter Pin	3
18	1-5474	A-2356	Pin—Lever	3
19	1-5492	M-276	Capscrew	3
20	1-833	M-101	Lockwasher	3
21	1-5493	A-3649	Roller Disc	1
22	1-6164	A-5388C	Floating Plate	1
23	1-5486	06478BH	Driving Plate Assembly—Consisting of:	1
	1-5487	6478B	Driving Plate	1
	1-1522	M-116	Rivet—Tubular	15
	1-6163	4579H	Friction Disc NOTE: Driving Plate Split into 3 Segments.	2
24	1-6160	6526CR	Hub and Back Plate	1
25	1-5490	1818	Spring—Release	6

POWER TAKEOFF CLUTCH CONTROL

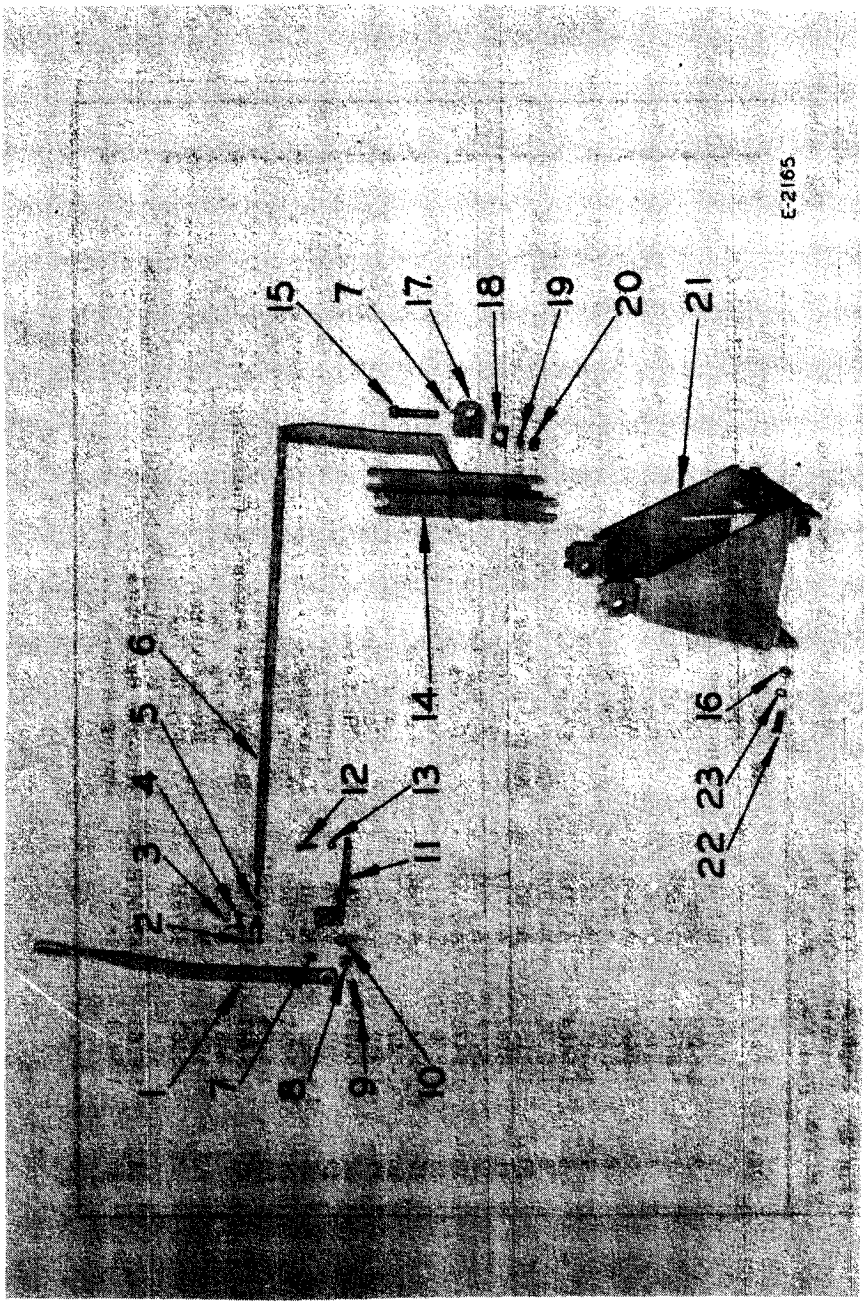

Figure 15 Power Takeoff Clutch Control

POWER TAKEOFF CLUTCH CONTROL

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 15	.....	Power Takeoff Clutch Control Group	1
1	178-1529	Lever–Clutch Control	1
2	5-2671	Clevis–For Control Link	2
3	.....	Cotter Pin–1/8"x7/8"	2
4	KL-367	Pin–For Clevis	2
5	.....	Nut–Jam–1/2"–20 N F	2
6	39-1472-A	Link–Control	1
7	1-443	Fitting–Grease–No. 1612 Alemite–Stewart-Warner Corp.	4
8	.....	Nut–3/4"–10 N C	1
9	113-1957	Capscrew	1
10	.....	Nut–Jam–3/4"–10 N C	1
11	178-1592	Bracket–For Lever	1
12	.....	Capscrew–1/2"–13x1 3/4" N C	2
13	.....	Lockwasher–1/2"	2
14	178-1533	Fork–Shifter	1
15	.....	Capscrew–3/4"–16x4 1/4" N F	3
16	.....	Nut–5/8"–18 N F	4
17	84-4364	Bearing–For Shifter Fork	3
18	97-4362	Shim–For Bearing	6
19	.....	Lockwasher–3/4"	3
20	.....	Nut–3/4"–16 N F	3
21	178-2555	Bracket–Shifter	1
22	.....	Capscrew–5/8"–18x1 3/4" N F	4
23	.....	Lockwasher–5/8"	4

PRIMARY COUNTERSHAFT

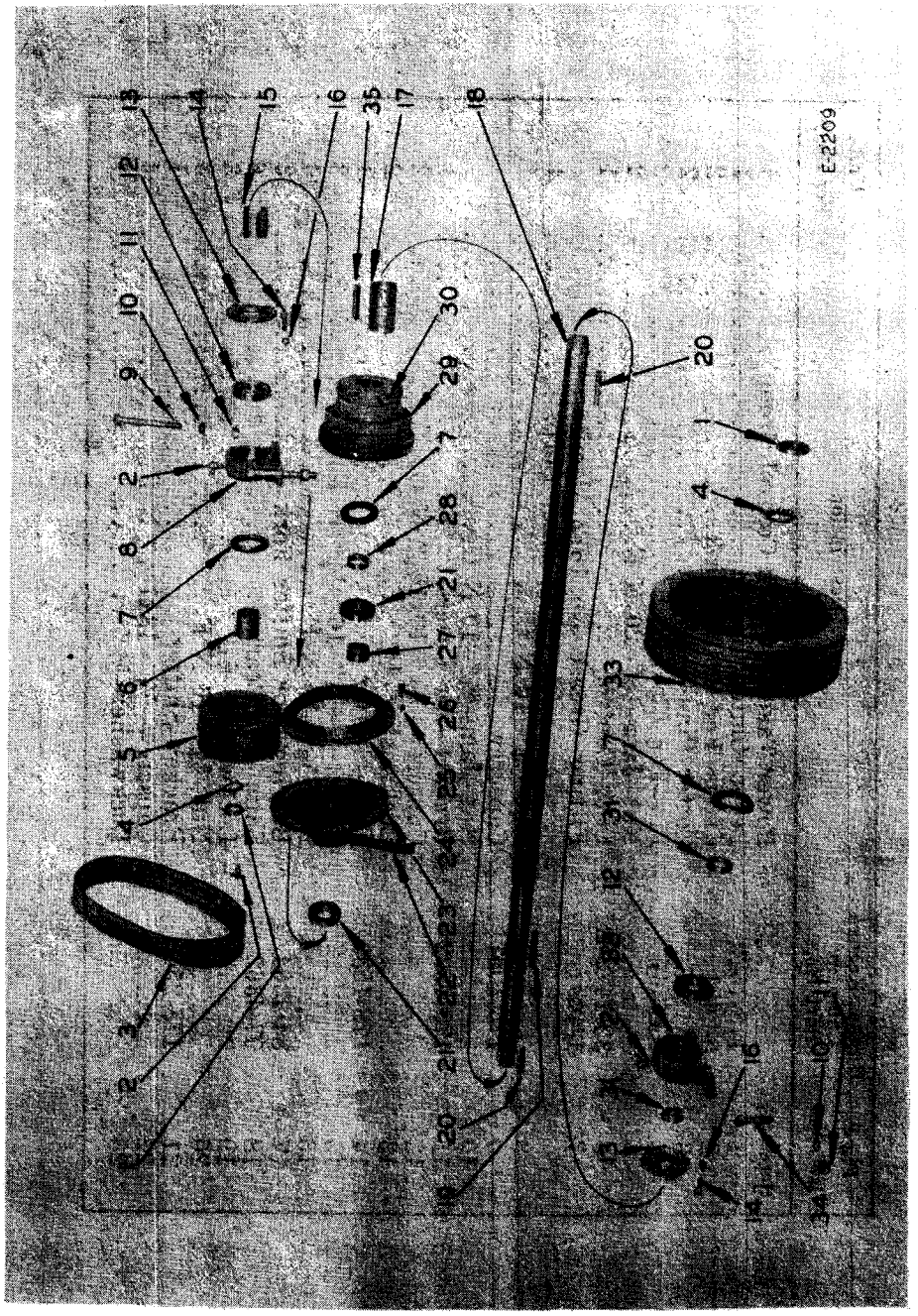

Figure 16 Primary Countershaft

PRIMARY COUNTERSHAFT

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig 16	.....	Primary Countershaft Group.....	1
1	1-67	Locknut–For Sheave N-08–SKF Industries, Inc.....	2
2	1-4989	Fitting–Grease–No. 1799– Measuring Fitting with No. 1637 Grease Fitting– Stewart-Warner Corp.....	3
3	1-5292	Belt–For Driving Reverse Countershaft– No. C-51–Dayton Rubber Co.....	4
4	1-68	Lockwasher–For Sheave– W–08–SKF Industries, Inc.....	2
5	151-6507	Sheave	1
6	152-333	Spacer–For Bearing.....	1
7	1-1266	Seal–Oil– 1315–Garlock Packing Co.....	3
8	152-305	Housing–For Bearing.....	1
9	.....	Capscrew–⅝"–18x5½" N F.....	2
10	.....	Lockwasher–⅝"	4
11	.....	Nut–⅝"–18 N F	4
12	1-5222	Bearing–For Shaft– 1209–SKF Industries, Inc.....	2
13	152-304	Cover–For Bearing Housing.....	2
14	.....	Capscrew–¼"–20x¾" N C.....	8
15	152-338	Spacer–For Bearings	1
16	.....	Lockwasher –¼"	8
17	152-1534	Sleeve–For Clutch.....	1
18	178-308A	Countershaft–Primary	1
19	21-1518A	Key–For Clutch.....	1
20	151-1518	Key–For Sheaves	2
21	1-4935	Bearing–For Sprocket and Hub 6209RS–SKF Industries, Inc.	2
22	178-362	Chain	1
23	152-1514	Sprocket and Hub.....	1
24	1-1384	Ring–Driving– 5796–Twin Disc Clutch Co.	1
25	.....	Lockwasher–⅜"	6
26	.....	Capscrew–⅜"–16x1" N C.....	6
27	21-1519	Spacer–For Bearings.....	1
28	21-1525	Spacer–For Bearings.....	1
29	1-6167	Clutch–Countershaft See Group 3-2.....	1
30	1-442	Fitting–Grease–No. 1610 Stewart-Warner Corp.....	1
31	178-307	Spacer–For Bearing	2
32	152-503	Housing–For Bearing.....	1
33	178-4729-A	Sheave	1
34	.....	Capscrew–⅝"–18x1¾" N F.....	2
35	24-1143	Key–For Sleeve	1

COUNTERSHAFT CLUTCH

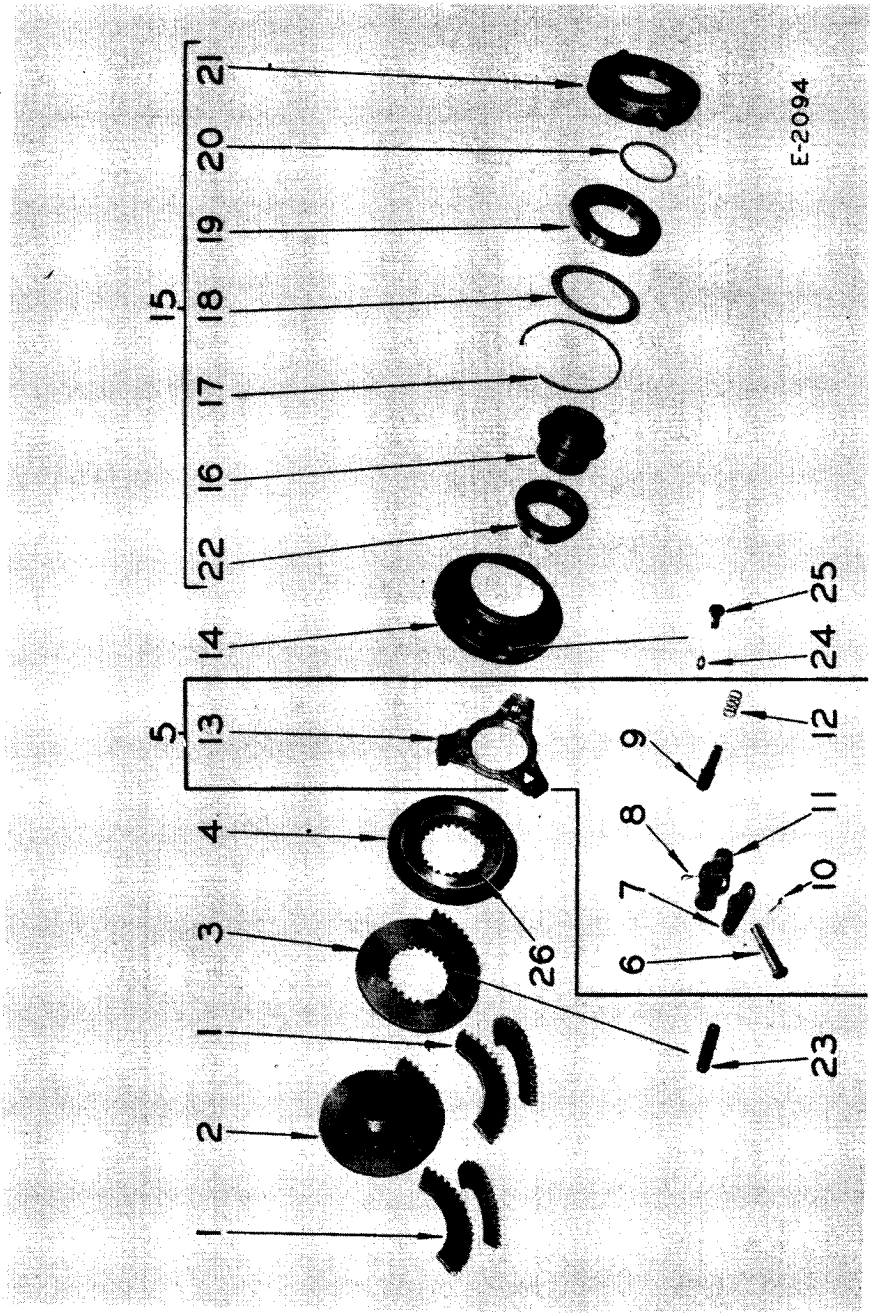

Figure 17 Countershaft Clutch

Fig & Ref. No.	Hughes-Keenan Part No.	Twin Disc Clutch Co. Part No.	Description	Units Per Assy.
Fig. 17	1-6167	CL-208	Countershaft Clutch Assembly Specification No. 18210—Twin Disc Clutch Co...	1
1	1-5486	06478BH	Driving Plate Assembly Consisting of:	2
	1-6163	4579H	Friction Discs	2
	1-1522	M-116	Rivets—Tubular	15
	1-5487	6478B	Driving Plate	1
			NOTE: Above Parts Are For One Assembly. Drive Plates Are Split into 3 Segments.	
2	1-5494	6528-AP	Hub and Back Plate	1
3	1-1635	4633	Center Plate	1
4	1-6164	A5388C	Floating Plate	1
5	1-6161	A-167	Adjusting Yoke Assembly Consisting of:	1
6	1-5474	A-2356	Lever Pins	3
7	1-5473	A-3470	Levers	6
8	1-5478	A-2603	Lever Springs	3
9	1-829	A-1683	Adjusting Lock Pin	1
10	1-812	105	Cotter Pins	3
11	1-5475	A-2234	Rollers	6
12	1-830	1382	Lock Pin Spring	1
13	1-6162	A-3747	Adjusting Yoke	1
14	1-6165	A-3762	Cover	1
15	1-5479	C-334	Cone Assembly—Consisting of:	1
16	1-5480	A-3552	Sleeve—Cone	1
17	1-5484	A-1016	Ring—Snap	1
18	1-5485	A-1366	Washer	1
19	1-5483	M-281	Bearing	1
20	1-3703	A-1688	Ring—Snap	1
21	1-5482	4852	Collar—Cone	1
22	1-5481	A-3469	Ring—Cone	1
23	1-1525	1930-A	Spring—Release	6
24	1-833	M-101	Lockwasher	3
25	1-5492	M-276	Capscrew	3
26	1-5493	A-3649	Disc—Roller	1

REVOLVING DRIVE CONTROL

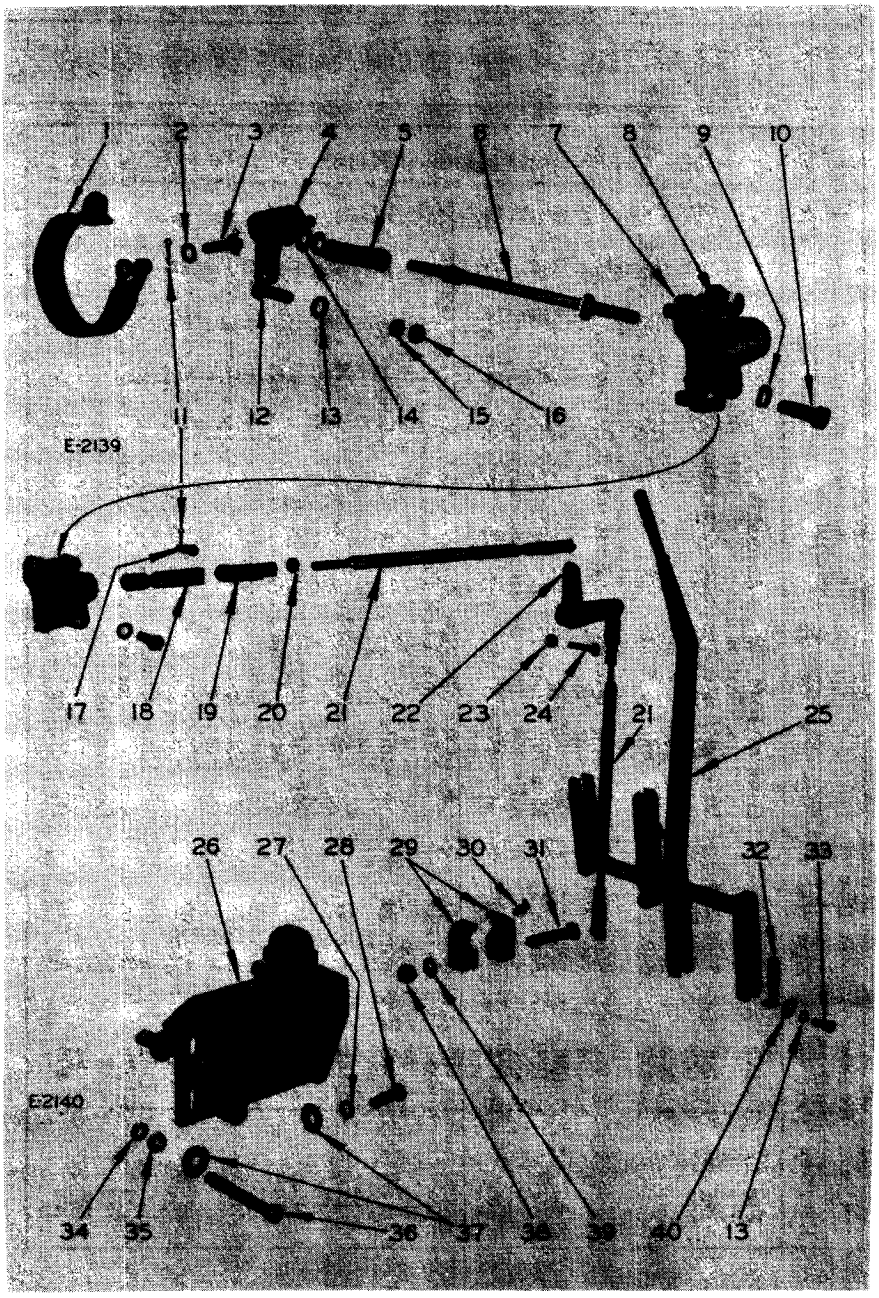

Figure 18 Revolving Drive Control

13283-A

REVOLVING DRIVE CONTROL

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 18	.....	Revolving Drive Control Group....	1
1	1-5369	Band–Brake–A-152-0–Braden Winch Co.....	1
2	.....	Bushing–Machinery–1/2"	2
3	152-4728	Pin–For Brake Band.....	1
4	152-344	Bracket–For Brake Band.....	1
5	CK-358	Spring	1
6	152-342	Link	1
7	152-4737	Bracket	1
8	1-442	Fitting–Grease–No. 1610 Alemite–Stewart-Warner Corp.....	1
9	.....	Lockwasher–1/2"	4
10	.....	Capscrew–1/2"–13 x 1 1/4" N C.....	4
11	.....	Cotter Pin–1/8" x 7/8".....	6
12	.....	Capscrew–1/2"–13 x 1 1/4" N C.....	2
13	.....	Lockwasher–1/2"	4
14	.....	Washer–Plain–3/8"	2
15	.....	Nut–Jam–7/16"–20 N F.....	2
16	.....	Nut–7/16"–20 N F.....	2
17	KL-367	Pin–For Clevis.....	4
18	152-4726	Plunger	1
19	5-2671	Clevis	4
20	.....	Nut–Jam–1/2"–20 N F.....	4
21	178-342	Link	2
22	152-352	Bellcrank	1
23	.....	Nut–Jam–3/4"–10 N C.....	1
24	24-6611	Capscrew	1
25	152-340	Lever	1
26	152-341	Bracket	1
27	.....	Lockwasher–5/8"	1
28	.....	Capscrew–5/8"–11 x 1 1/2" N C.....	1
29	84-4364	Bearing	2
30	1-443	Fitting–Grease–No. 1612 Alemite Stewart-Warner Corp.....	2
31	.....	Capscrew–3/4"–16 x 4" N F.....	2
32	152-368	Bracket	2
33	.....	Capscrew–1/2"–13 x 1" N C.....	2
34	.....	Nut–Jam–5/8"–18 N F.....	2
35	.....	Nut–5/8"–18 N F.....	2
36	.....	Capscrew–5/8"–18 x 5 3/4" N F.....	2
37	.....	Washer–Plain–5/8"	3
38	.....	Nut–3/4"–16 N F.....	2
39	.....	Lockwasher–3/4"	2
40	.....	Washer–Plain–1/2"	2

13283-A

COUNTERSHAFT DRIVE BELT IDLER

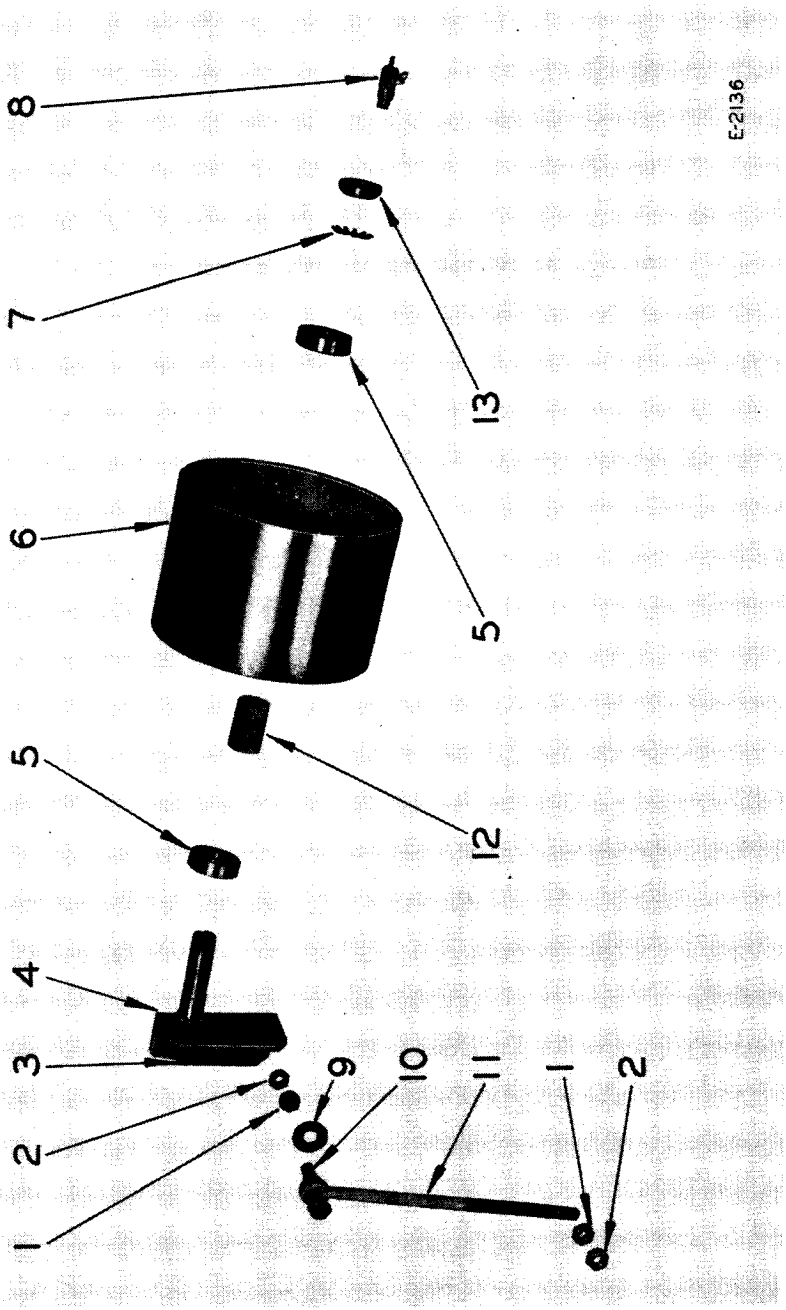

Figure 19 Countershaft Drive Belt Idler

COUNTERSHAFT DRIVE BELT IDLER

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 19	151A-1002	Countershaft Drive Belt Idler Assembly.....	1
1	.....	Nut–½"–20 N F.....	3
2	.....	Nut–Jam–½"–20 N F.....	3
3	.....	Capscrew–½"–20 x 2" N F.....	1
4	151-344	Bracket–For Idler	1
5	1-5239	Bearing–For Idler Sheave 6205RS–SKF Industries, Inc.....	2
6	151-389	Sheave–Idler	1
7	1-5353	Lockwasher W-05–SKF Industries, Inc.....	1
8	1-4989	Fitting–Grease–No. 1799 Measuring Fitting with No. 1637 Grease Fitting– Stewart-Warner Corp.....	1
9	.....	Washer–Plain–½"	2
10	.....	Capscrew–½"–20 x 2½" N F.....	1
11	121-1481	Bolt–Adjustment	1
12	151-316	Spacer–For Bearings	1
13	1-5352	Locknut N-05 SKF Industries, Inc.	1

REVERSE COUNTERSHAFT

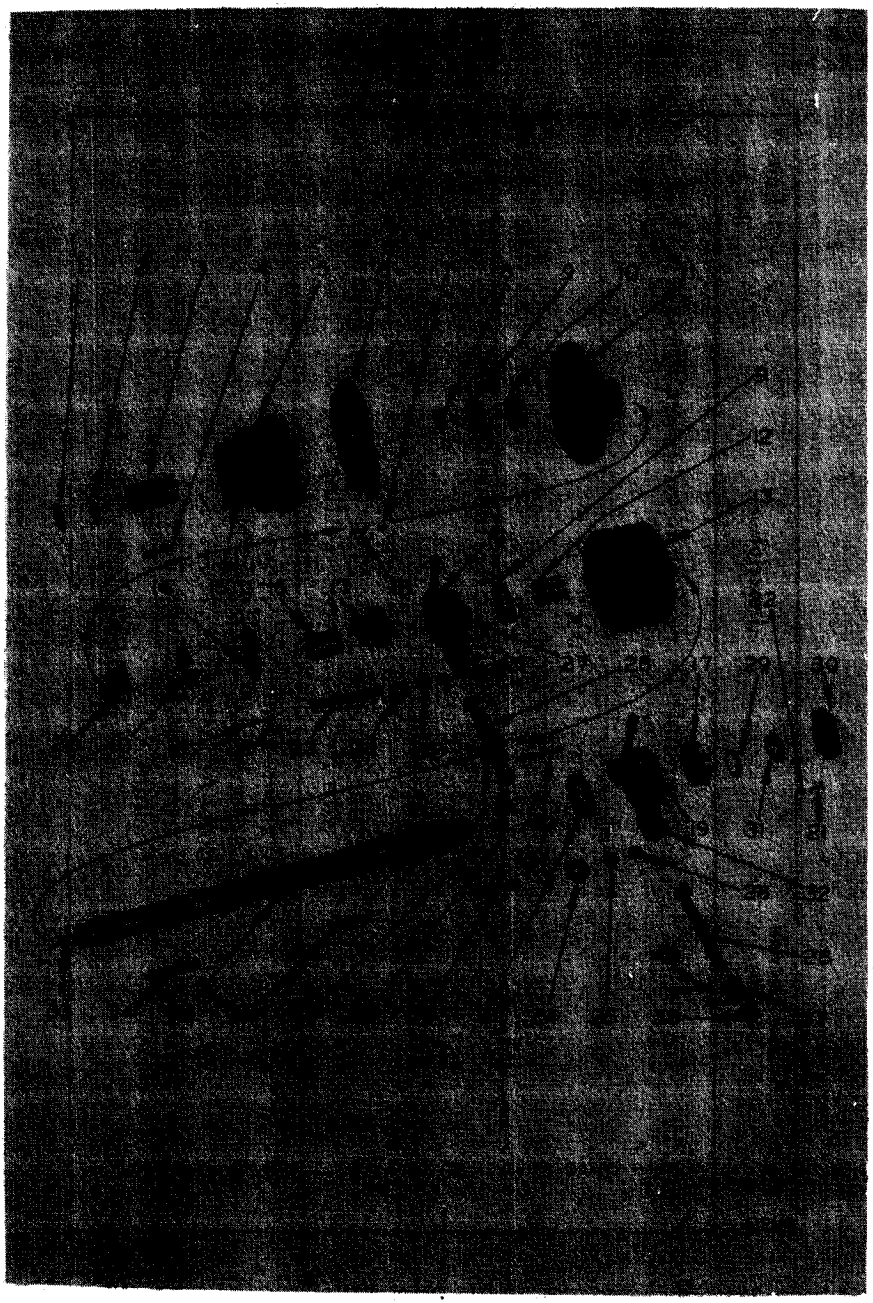

Figure 20 Reverse Countershaft

13239-A

REVERSE COUNTERSHAFT

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 20	.....	Reverse Countershaft Group.....	1
1	1-67	Locknut—For Sleeve N-08—SKF Industries, Inc.....	1
2	1-68	Lockwasher—For Sleeve W-08—SKF Industries, Inc.....	1
3	152-1534	Sleeve—For Clutch	1
4	24-1143	Key—For Sleeve	1
5	1-6167	Countershaft Clutch Assembly See Group 3-2.....	1
6	1-1384	Ring—Driving 5796—Twin Disc Clutch Co.....	1
7	.....	Lockwasher—⅜"	6
8	21-1525	Spacer—For Bearing.....	1
9	1-1266	Seal—Oil 1315—Garlock Packing Co.....	3
10	1-4935	Bearings—For Sprocket and Hub 6209RS—SKF Industries, Inc.....	2
11	152-1514	Sprocket and Hub—For Clutch.....	1
12	152-333	Spacer—For Sheave	1
13	151-6507	Sheave	1
14	152-304	Cover—For Bearing Housing.....	1
15	1-443	Fitting—Grease—No. 1612 Alemite Stewart-Warner Corp.....	1
16	152-338	Spacer—For Bearings.....	1
17	1-5222	Bearing—For Shaft 1209—SKF Industries, Inc.....	2
18	.....	Capscrew—⅜"—16 x 1" N C	6
19	1-442	Fitting—Grease—No. 1610 Alemite Stewart-Warner Corp.....	2
20	21-1519	Spacer—For Bearings.....	1
21	.....	Capscrew—¼"—20 x ¾" N C.....	8
22	.....	Lockwasher—¼"	8
23	.....	Capscrew—⅝"—18 x 5¾" N F.....	2
24	.....	Washer—Plain—⅝"	4
25	.....	Nut—⅝"—18 N F.....	4
26	.....	Nut—Jam—⅝"—18 N F.....	4
27	152-305	Housing—For Bearing	1
28	FS-1215A	Bolt—Adjustment	2
29	1-70	Lockwasher W-09-SKF Industries, Inc.....	1
30	152-504	Cover—For Bearing Housing.....	1
31	1-69	Locknut N-09—SKF Industries, Inc.....	1
32	152-503	Housing—For Bearing	1
33	1-4989	Fitting—Grease—No. 1799 Measuring Fitting with No. 1637 Grease Fitting Stewart-Warner Corp.....	1
34	21-1518A	Key—For Clutch.....	1
35	178-508	Shaft	1
36	151-1518	Key—For Sheave	1
37	.....	Nut—¾"—10 N C.....	4
38	.....	Nut—Jam—¾"—10 N C.....	2
39	.....	Capscrew—⅝"—18 x 2½" N F.....	2
40	.....	Cotter Pin—¼" x 2½".....	2

13239-A

REVOLVING DRIVE CHAIN IDLER

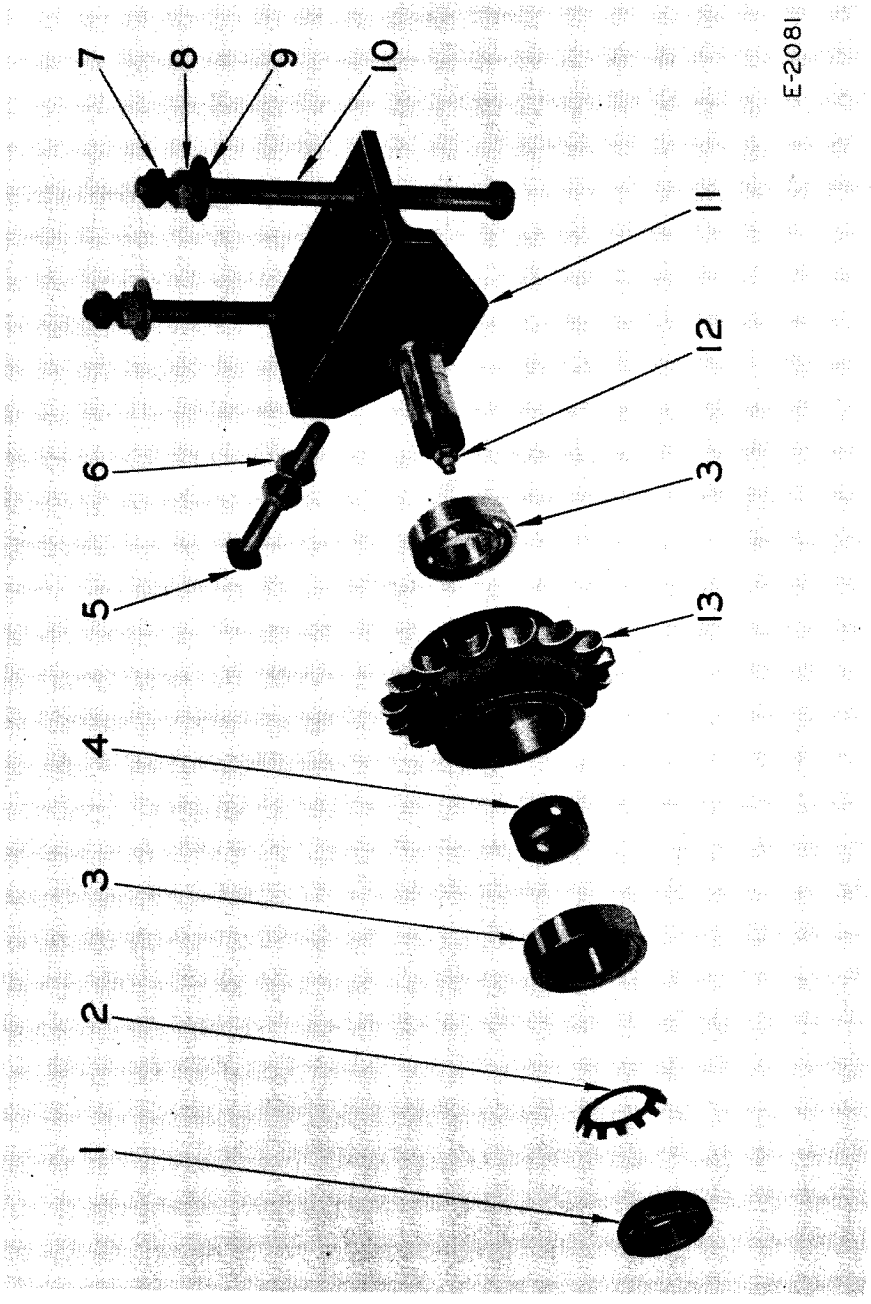

Figure 21 Revolving Drive Chain Idler

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 21	151A-1005	Revolving Drive Chain Idler Assembly	1
1	1-5352	Locknut–For Idler Shaft N-05–SKF Industries, Inc.	1
2	1-5353	Lockwasher–For Idler Shaft W-05–SKF Industries, Inc.	1
3	1-5239	Bearing–For Idler Sprocket 6205RS–SKF Industries, Inc	2
4	151-188	Spacer–For Bearings	1
5	RL-1755	Bolt–For Bracket Adjustment	1
6	.....	Nut–Jam–½"–13 N C	2
7	.....	Nut–Jam–½"–20 N F	2
8	.....	Nut–½"–20 N F	2
9	.....	Washer–Plain–½"	2
10	.....	Cap Screw–½"–20x7½" N F	2
11	152-391	Bracket–Idler	1
12	1-442	Fitting–Grease–No. 1610 Alemite Stewart-Warner Corp.	1
13	152-337	Sprocket–Idler	1

BOOM COLUMN

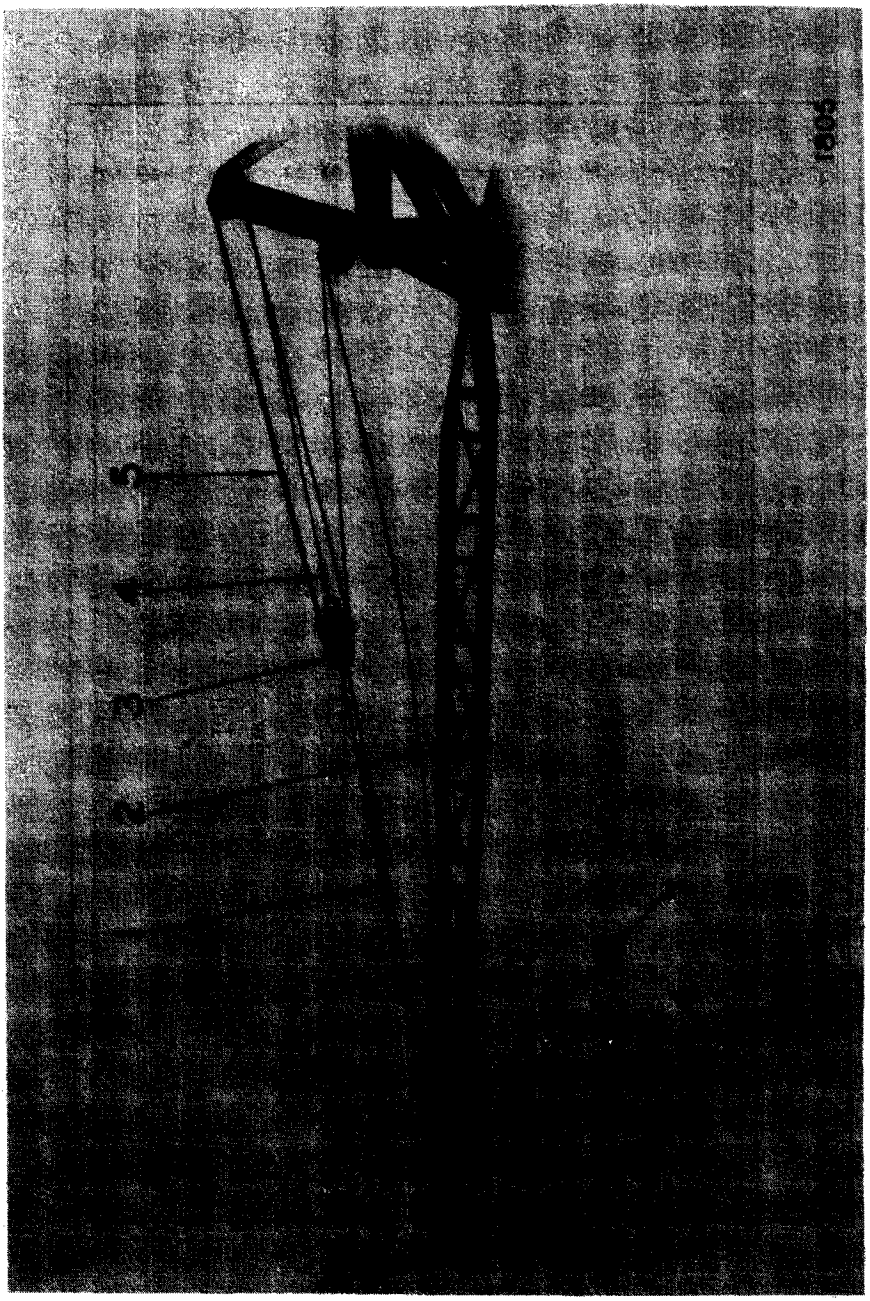

Figure 22 Boom Column

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 22	.....	Boom Column Group.....	1
1	152-643	Cable	1
2	152-645	Cable-Load	1
3	152A-6003	Bridle Sheave Assembly See Group 6-4.....	1
4	1-158	Clamp–For ½" Cable	6
5	152-644	Cable-Boom	1
6	178A-6001	Swivel Hook Block Assembly See Group 6-3.....	1
7	178-619	Boom	1

BOOM POINT

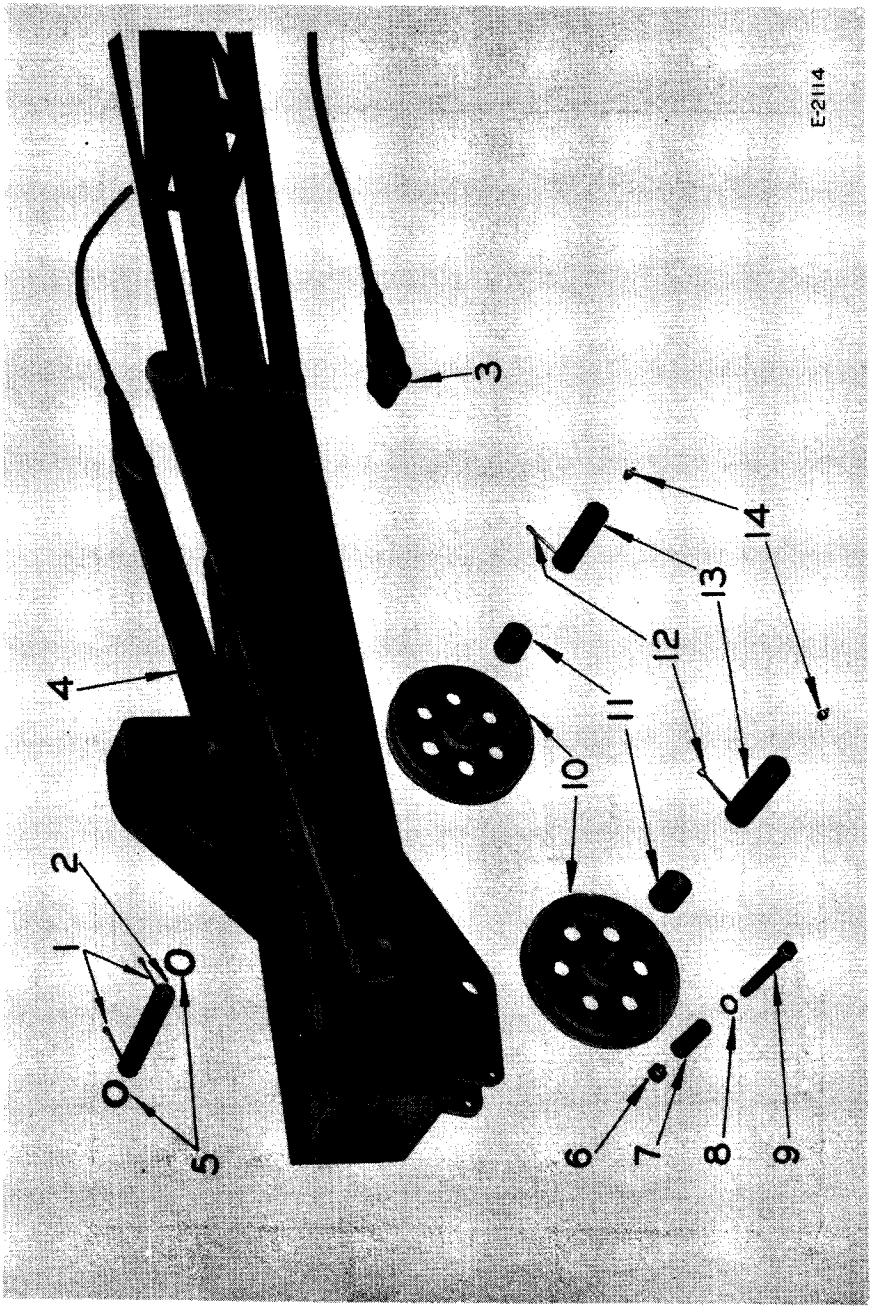

Figure 23 Boom Point

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 23	.....	Boom Point Group.....	1
1	.....	Cotter Pin—1/4" x 2 1/2".....	2
2	152-626	Pin	1
3	1-5341	Clevis—For Cable—3/4" Electroline Co.....	2
4	152-657	Link	2
5	.....	Bushing—Machinery—1 1/2".....	2
6	.....	Nut—5/8"—11 N C.....	1
7	152-616	Spacer	1
8	.....	Lockwasher—5/8"	1
9	.....	Capscrew—5/8"—11 x 5 1/4" N C.....	1
10	151-1296	Sheave	2
11	1-5673	Bushing—For Sheaves.....	2
12	.....	Cotter Pin—1/4" x 3".....	2
13	152-6605A	Pin—For Sheaves.....	2
14	1-442	Fitting—Grease—No. 1610 Alemite—Stewart-Warner Corp.....	2

SWIVEL HOOK BLOCK

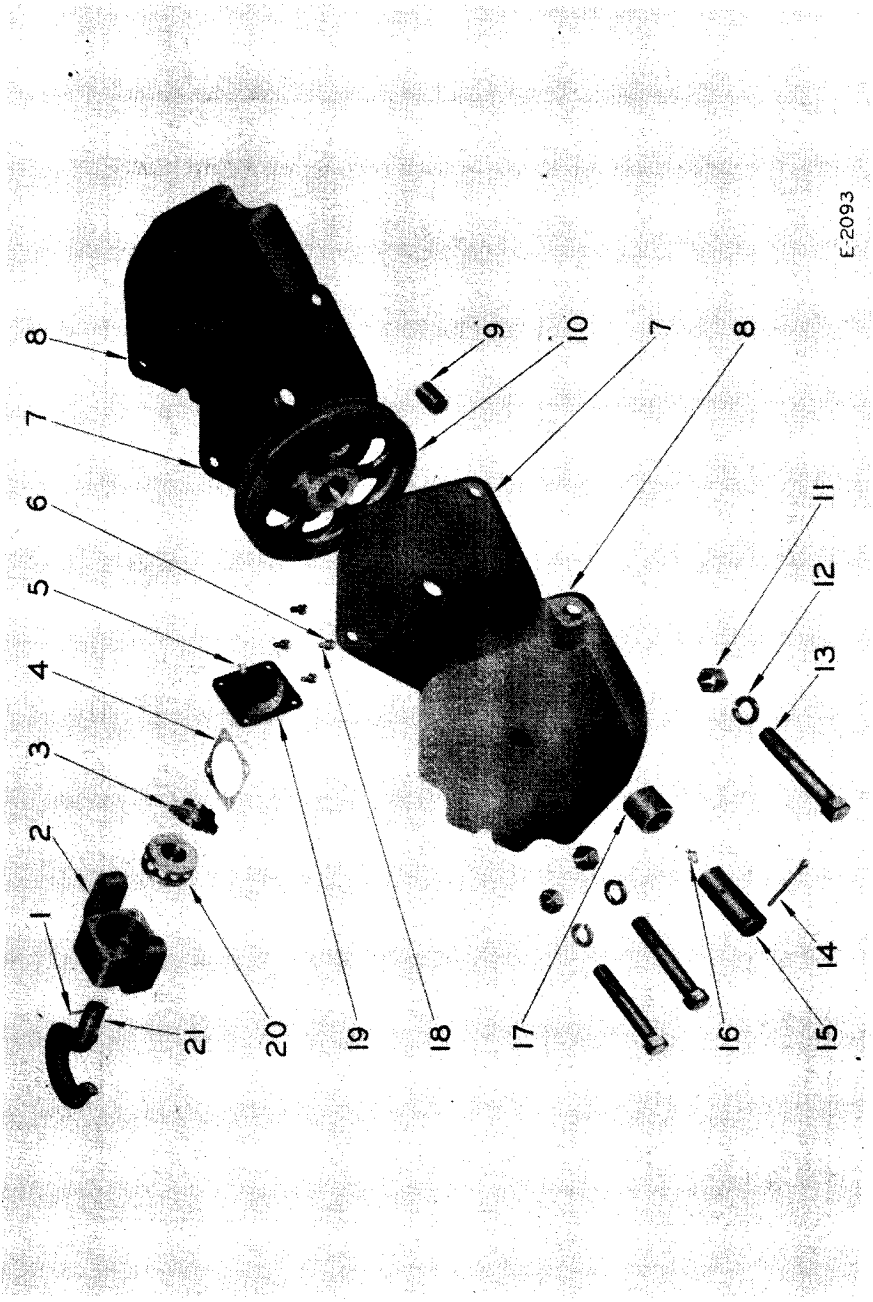

Figure 24 Swivel Hook Block

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 24	178A-6001	Swivel Hook Block Assembly	1
1	.....	Cotter Pin—¼"x2"	1
2	19-699	Housing—For Bearing	1
3	19-638	Nut—For Swivel Block Hook	1
4	19-618	Gasket—For Bearing Housing	1
5	1-443	Fitting—Grease—No. 1612 Alemite Stewart-Warner Corp.	1
6	.....	Lockwasher—⅜"	4
7	18-683	Plate—Side	2
8	166-681	Weight	2
9	BL-11A	Spacer—For Side Plates	1
10	BL-1	Sheave	1
11	.....	Nut—¾"—16 N F	3
12	.....	Lockwasher—¾"	3
13	.....	Capscrew—¾"—16 x 4¾" N F	3
14	.....	Cotter Pin—7/32"x2½"	1
15	BL-5	Shaft	1
16	1-442	Fitting—Grease—No. 1610 Alemite Stewart-Warner Corp.	1
17	PLT-576-1	Bushing—For Shaft	1
18	.....	Capscrew—⅜"—16x1" N C	4
19	19-639	Cover—For Bearing Housing	1
20	152A-6005	Bearing—Consisting of:	1
	152-6638	Race	2
	1-6282	Balls—¾"—No. 3 Grade Atlas Ball Div. of SKF Industries, Inc.	10
21	19-647	Hook	1

BRIDLE SHEAVE

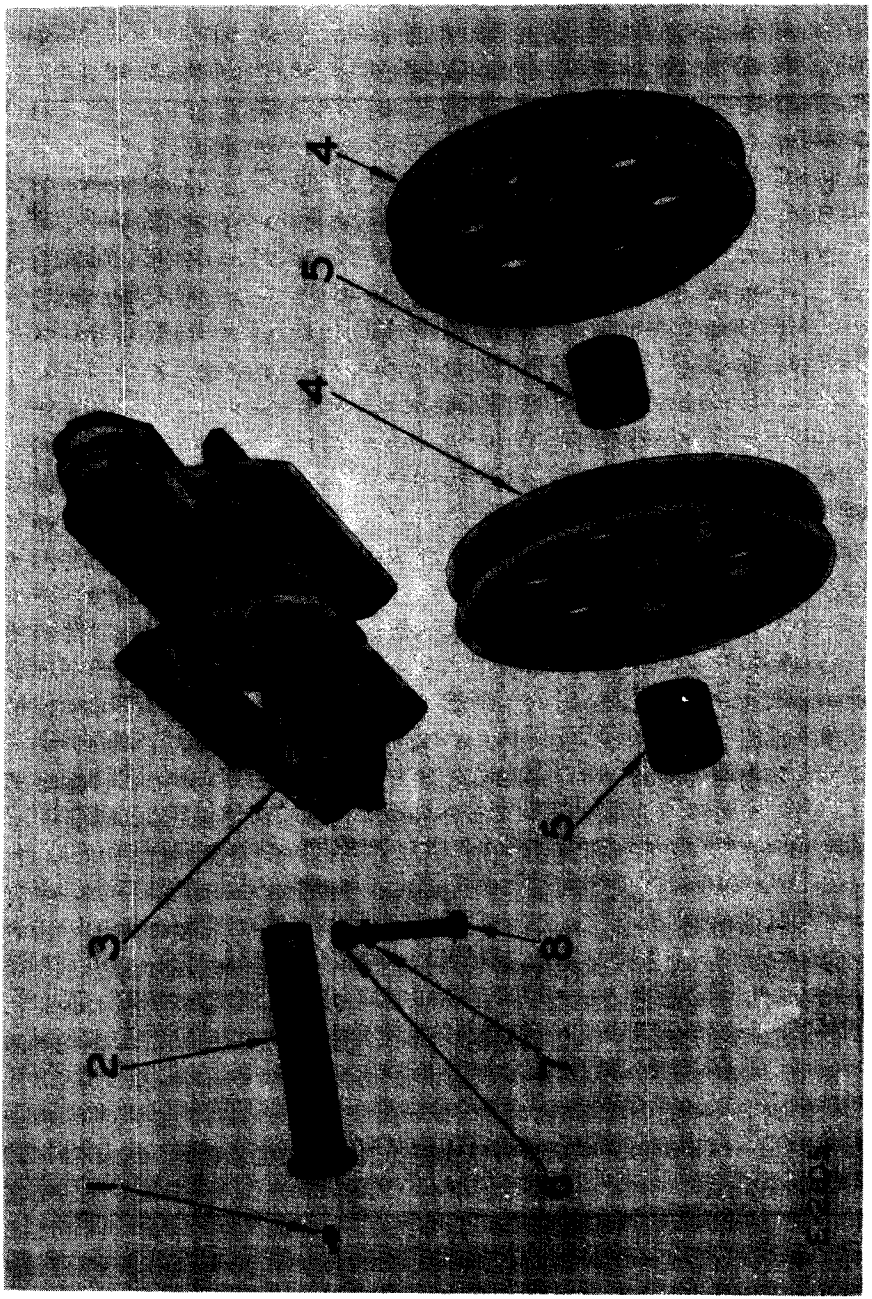

Figure 25 Bridle Sheave

BRIDLE SHEAVE

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 25	152A-6003	Bridle Sheave Assembly	1
1	1-442	Fitting–Grease–No. 1610 Alemite Stewart-Warner Corp.	1
2	152-602	Pin–For Sheaves	1
3	152-653A	Block	1
4	151-1296	Sheave	2
5	1-5673	Bushing	2
6	.....	Nut–½"–13 N C	1
7	.....	Lockwasher–½"	1
8	.....	Capscrew–½"–13x3¾" N C	1

MAST COLUMN

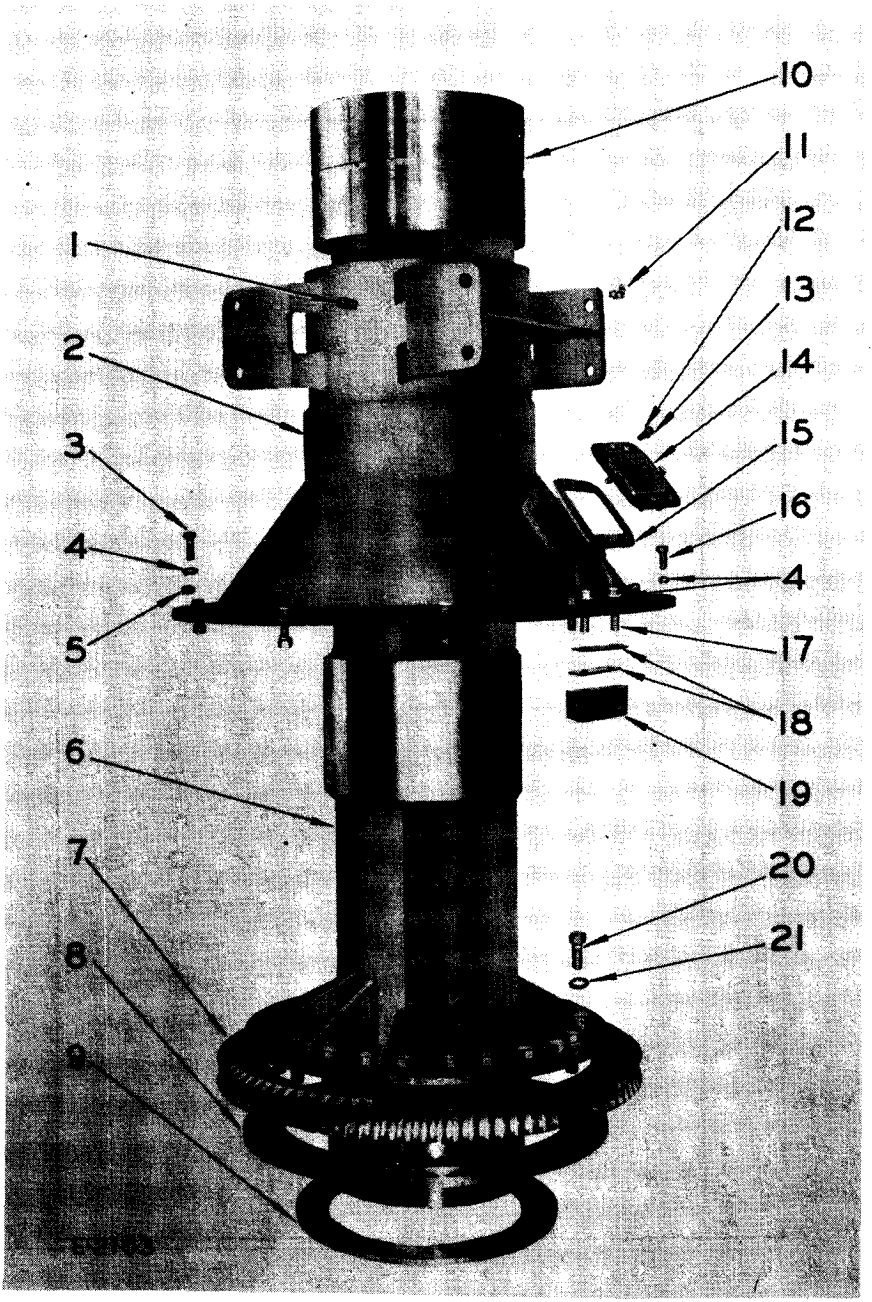

Figure 26 Mast Column

MAST COLUMN

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 26	.....	Mast Column Group	1
1	152-6603	Pin-Dowel–For Bushing.....	1
2	151-699	Housing–For Bearings.....	1
3	.....	Capscrew–½"–20 x 1¾" N F.....	7
4	.....	Lockwasher–½"	12
5	.....	Nut–½"–20 N F.....	7
6	151-615	Mast	1
7	1-5151	Gear	1
8	152-625	Ring–For Gear	1
9	151-612	Washer	1
10	151-679	Bushing–For Mast.....	1
11	1-443	Fitting–Grease–No. 1612 Alemite Stewart-Warner Corp.....	1
12	.....	Lockwasher–⅜"	6
13	.....	Capscrew–⅜"–16 x ¾" N C.....	6
14	1-2006	Cover–Hand Hole No. 50-267-2–Spicer Mfg. Co...	1
15	151-618	Gasket–For Cover.....	1
16	.....	Capscrew–½"–13 x 1¼" N C.....	3
17	.....	Capscrew–½"–13 x 1½" N C.....	2
18	151-617	Shim–For Bar	2
19	151-666	Bar	1
20	.....	Capscrew–¾"–16 x 2" N F.....	24
21	1-5568	Lockwasher–¾" with internal teeth Shakeproof Lockwasher Co....	24

LOWER MAST HOUSING

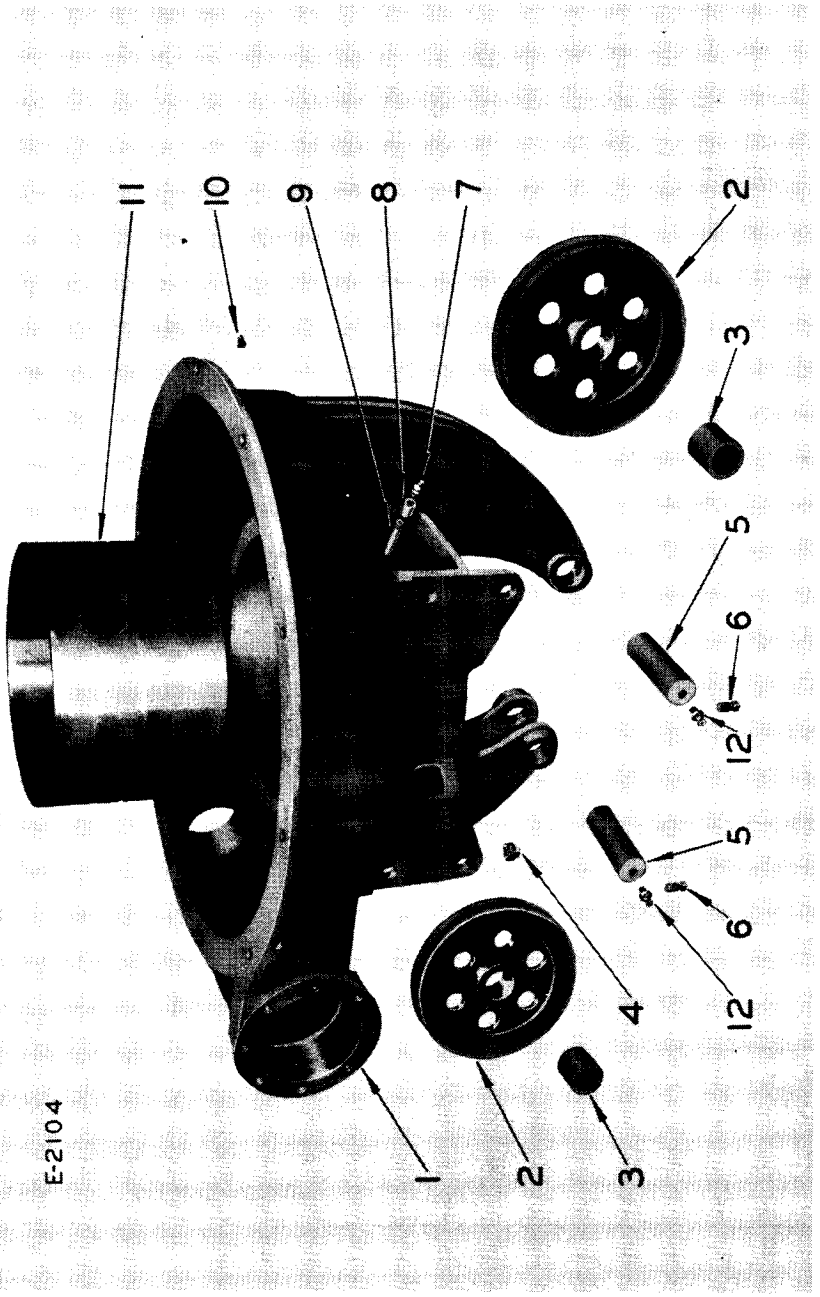

Figure 27 Lower Mast Housing

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 27	.....	Lower Mast Housing Group.....	1
1	151-611	Housing–Worm Drive.....	1
2	151-1296	Sheave	2
3	1-5673	Bushing–1½" I. D. x 1⅞" Long Johnson Bronze Co.....	2
4	1-1499	Plug–Drain–For Housing 1¼"–Lisle Corporation.....	1
5	151-626	Pin–For Sheave	2
6	.....	Setscrew–Square Head–½"–13 x ¾" N C.....	2
7	1-443	Fitting–Grease–No. 1612 Alemite Stewart-Warner Corp.....	1
8	1-220	Coupling–For Grease Fitting –⅛".....	1
9	1-2081	Nipple–For Grease Fitting –⅛"x 2½".....	1
10	1-365	Plug–Level –⅜".....	1
11	151-679	Bushing–For Mast	1
12	1-442	Fitting-Grease–No. 1610 Alemite Stewart-Warner Corp.....	2

MAST WORM SHAFT

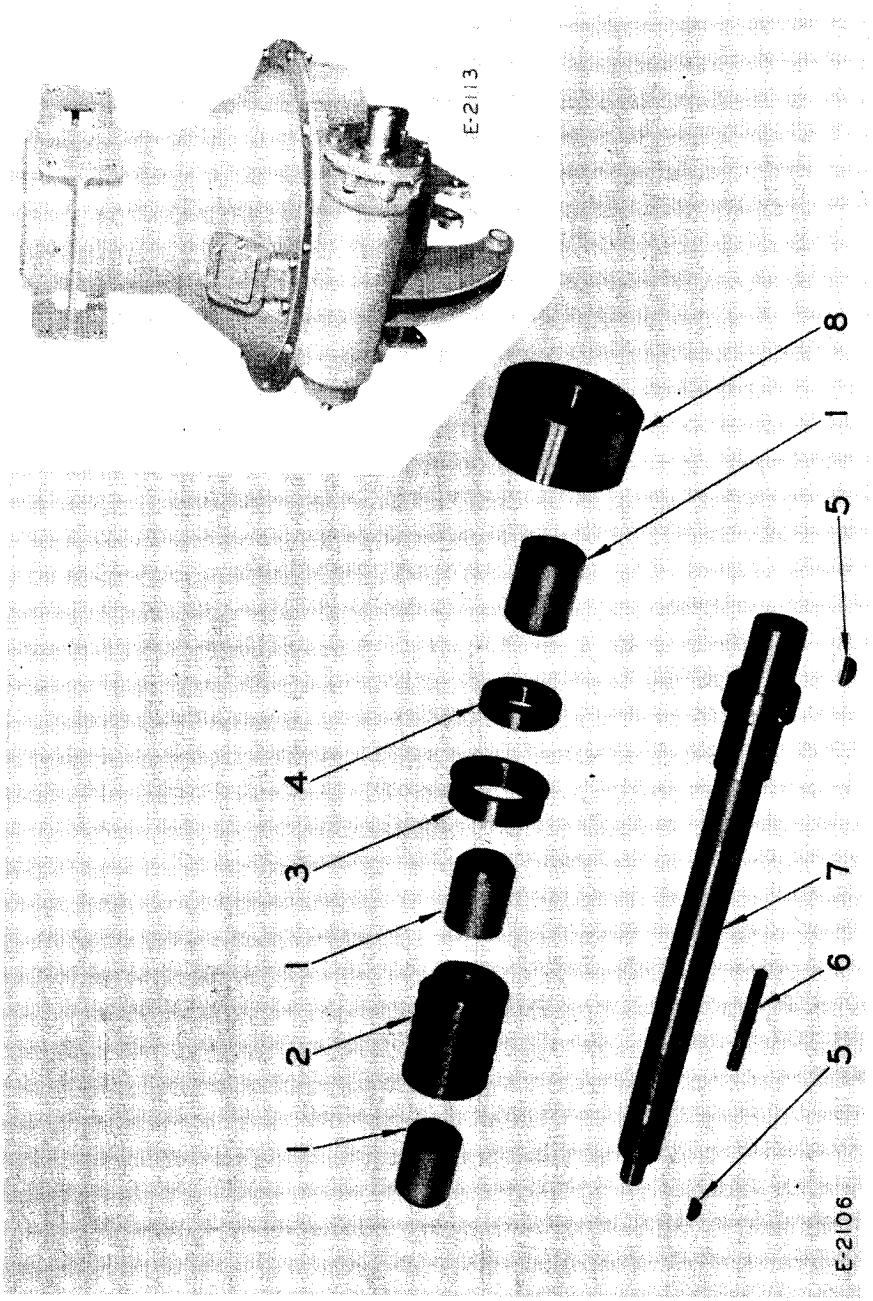

Figure 28 Mast Worm Shaft

MAST WORM SHAFT

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 28	.....	Mast Worm Shaft Group.....	1
1	151-669	Spacer–For Worm.....	3
2	1-5152	Worm–EU-2–Braden Winch Co.....	1
3	151-616	Sleeve–For Bearing	1
4	1-4935	Bearing–For Worm Shaft 6209RS–SKF Industries, Inc.....	1
5	1-5392	Key–For Worm Shaft–Woodruff No. 18–Whitney Mfg. Co.....	2
6	151-614	Key–For Worm.....	1
7	151-664	Shaft	1
8	1-5237	Bearing–For Worm Shaft– 5411–Marlin-Rockwell Corp.....	1

MAST WORM SHAFT

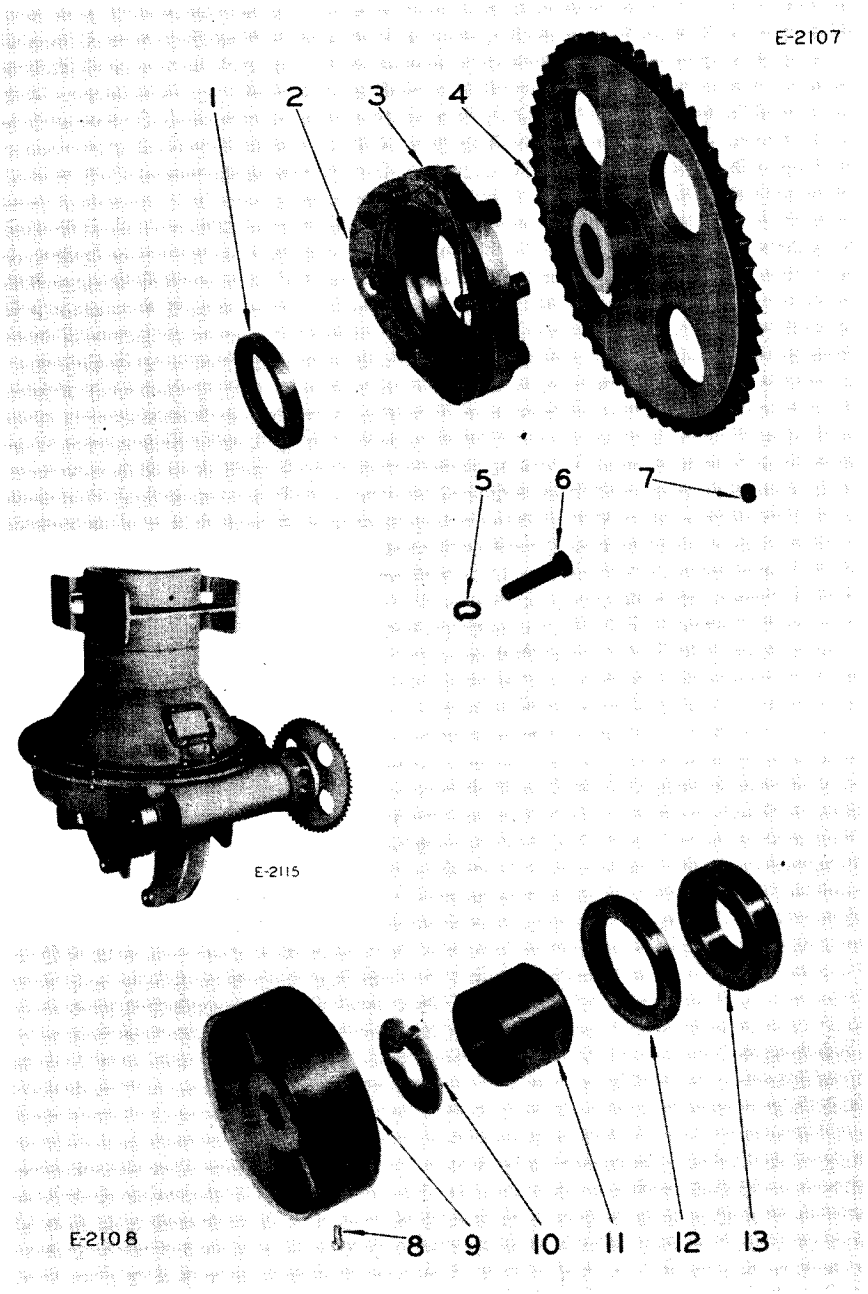

Figure 29 Mast Worm Shaft

13204-A

MAST WORM SHAFT

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig. 29	.....	Mast Worm Shaft Group.....	1
1	1-479	Oil Seal–375224M-1 Sirvene No. 80 Chicago Rawhide Co.....	1
2	152-618	Gasket	3
3	151-639	Cover–Bearing	1
4	178-613	Sprocket	1
5	.....	Lockwasher–½"	8
6	1-5283	Capscrew–Hex. Hd.	8
7	.....	Setscrew–Bristo–½"–13 N C.....	1
8	.....	Setscrew–Square Head–⅜" x 1 N C	1
9	1-5368	Brake Drum – A-551–Braden Winch Co.....	1
10	151-6606	Lockwasher	1
11	151-638	Locknut	1
12	1-3855	Oil Seal–350216M-1 Sirvene No. 80– Chicago Rawhide Co.....	1
13	1-4935	Bearing–6209RS– SKF Industries, Inc.....	1

ENGINE CONTROLS

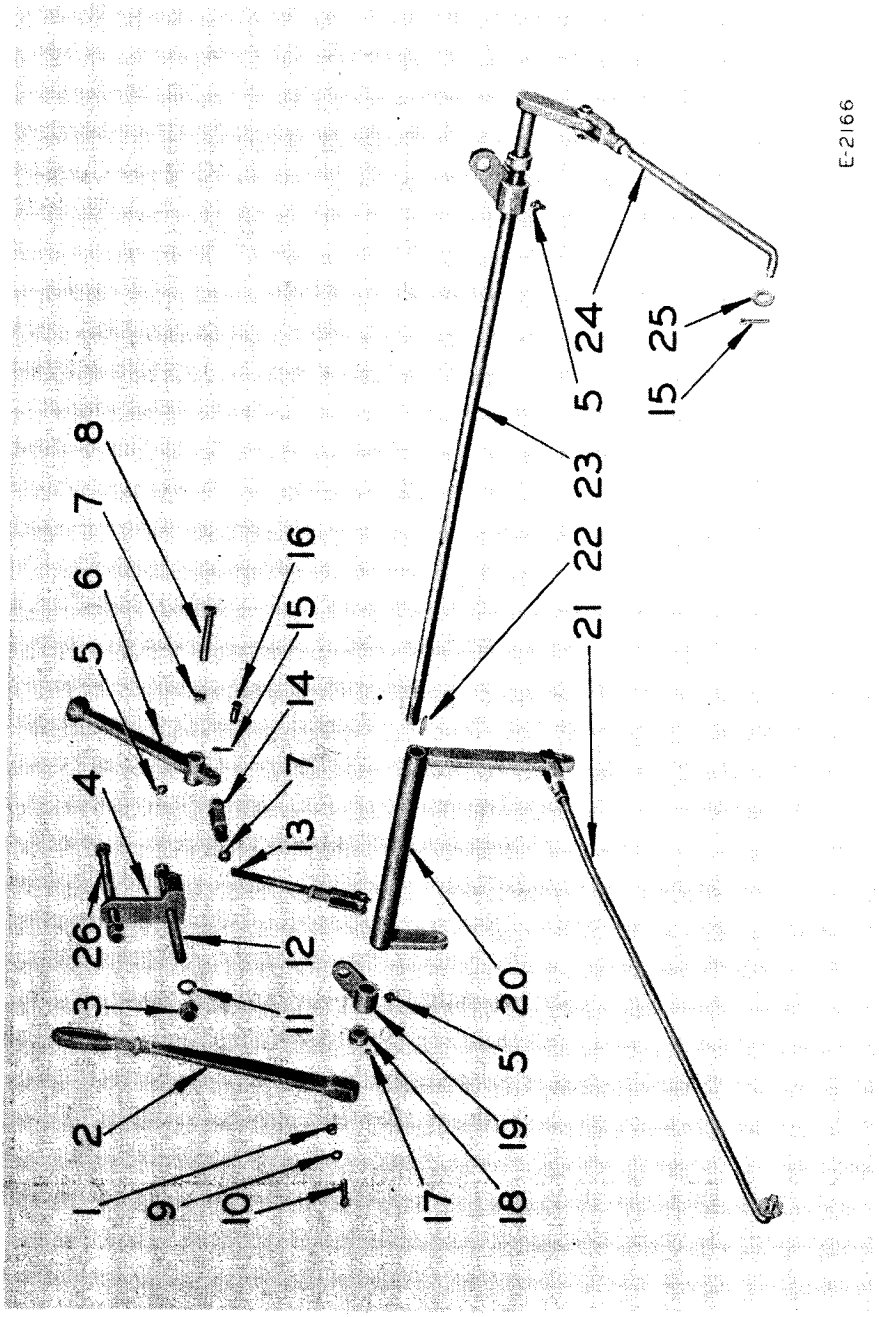

Figure 30 Engine Controls

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 30	.....	Engine Controls Group	1
1	.....	Nut–3/8"–24 N F	1
2	178-988	Lever–Compression Release	1
3	40-132	Nut–For Capscrews	2
4	178-902	Bracket–For Throttle Lever	1
5	1-6220	Fitting–Grease–No. 1641 Alemite–Stewart-Warner Corp.	4
6	178-903	Lever–Throttle	1
7	.....	Nut–Jam–1/2"–20 N F	5
8	178-910	Capscrew–For Throttle Lever	1
9	.....	Lockwasher–3/8"	1
10	.....	Capscrew–3/8"–24x2" N F	1
11	.....	Lockwasher–3/4"	2
12	178-1226	Capscrew–For Throttle Bracket	1
13	178-909	Link–For Throttle	1
14	5-2671	Clevis–For Links	4
15	.....	Cotter Pin–1/8"x7/8"	6
16	KL-367	Pin–For Clevis	4
17	.....	Setscrew–Bristo–3/8"–16x1/2" N C	2
18	RLX-920A	Set Collar–For Control Shaft	2
19	178-946	Bearing–For Control Shaft	2
20	178-918	Shaft–Throttle Lever	1
21	178-919	Link–Throttle	1
22	2KS-969	Key–For Compression Release Lever	1
23	178-950	Shaft–Compression Release	1
24	178-931	Link–Compression Release	1
25	.....	Bushing–Machinery–1/2"	2
26	152-1226	Capscrew–For Throttle Bracket	1

MAIN FRAME

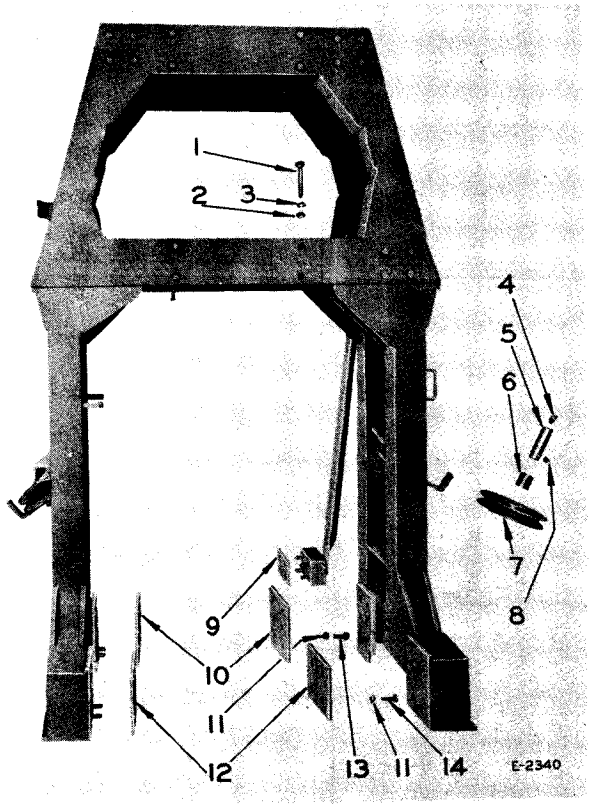

Figure 31 Main Frame

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig. 31	.....	Main Frame Group	1
1	152-1287	Capscrew	2
2	.....	Lockwasher—¾"	2
3	40-132	Nut	2
4	1-1854	Fitting—Grease—No. 1611 Alemite—Stewart-Warner Corp.	2
5	151-626	Pin—For Sheave	2
6	1-5673	Bushing—For Sheave	2
7	151-1296	Sheave	2
8	.....	Setscrew—Sq. Hd.—½"—13x1"	2
9	178-1206	Spacer—For Frame	2
10	178-1220	Spacer—For Frame	2
11	.....	Lockwasher—⅞"	8
12	178-1207	Spacer—For Frame	2
13	.....	Capscrew—⅞"—9x4" N C	4
14	.....	Capscrew—⅞"—9x3½" N C	4

13496-A

MAIN FRAME

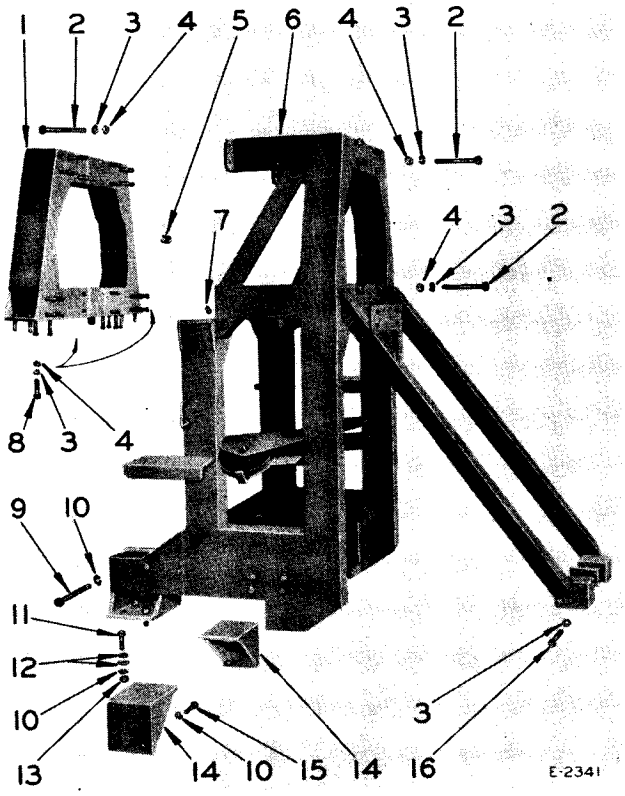

Figure 32 Main Frame

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig. 32	.....	Main Frame Group	1
1	178-1289	Cross Member	1
2	152-1226	Capscrew—For Frame	26
3	.....	Lockwasher—¾"	48
4	40-132	Nut—For 152-1226 Capscrew	30
5	RL-749	Spacer	1
6	178-1201	Frame—Main	1
7	1-6220	Fitting—Grease—No. 1641 Alemite—Stewart-Warner Corp.	1
8	152-5208	Capscrew	14
9	.....	Capscrew—⅞"—9:x 9" N C	12
10	.....	Lockwasher—⅞"	32
11	.....	Capscrew—⅞"—14x2¾" N F	8
12	.....	Washer—Plain—⅞"	16
13	.....	Nut—⅞"—14 N F	8
14	178-1202	Support—For Frame	2
15	.....	Capscrew—⅞"—9x2" N C	12
16	.....	Capscrew—¾"—10x5" N C	8

13474-A

COUNTERWEIGHT FRAME

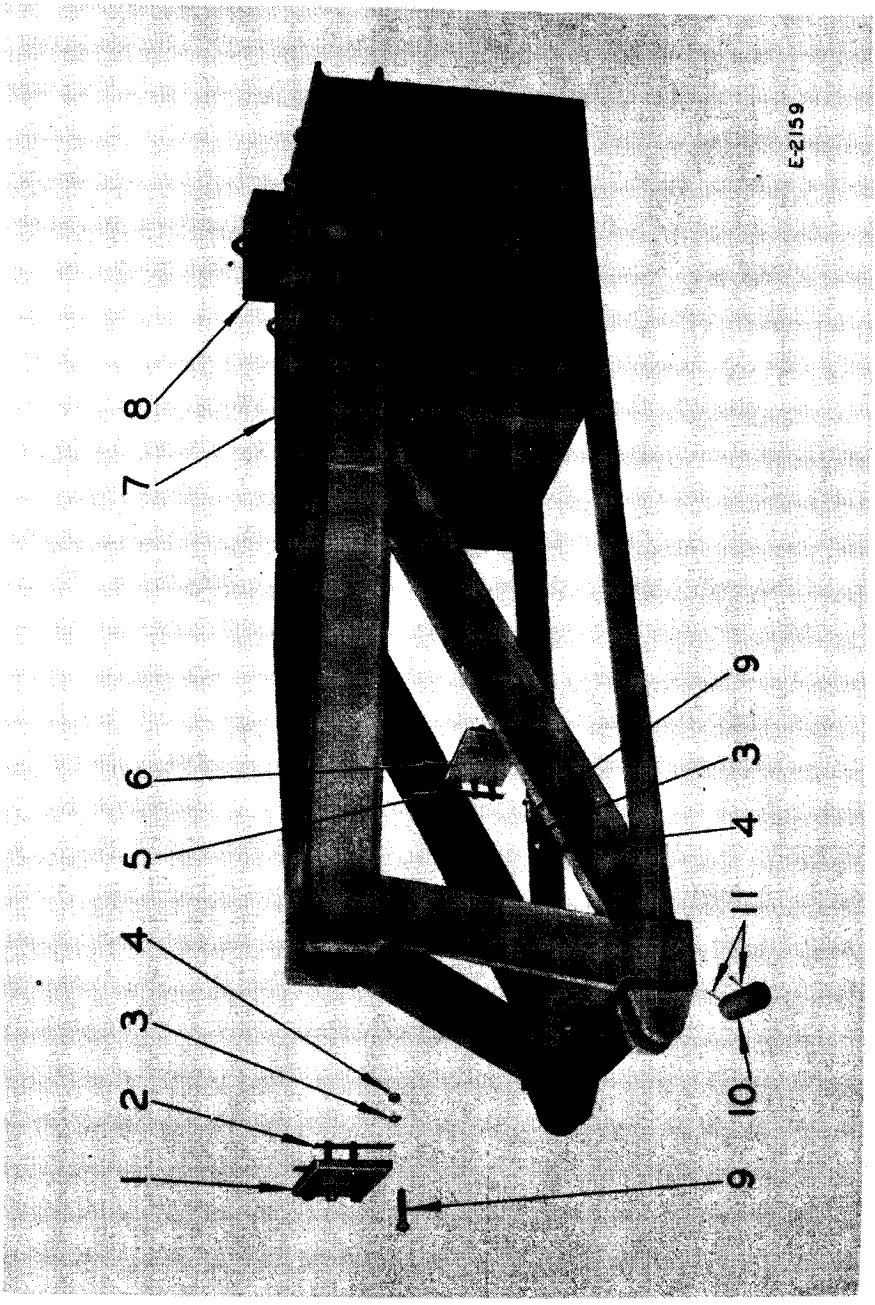

Figure 33 Counterweight Frame

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 33	.....	Counterweight Frame Group.....	1
1	178-6602	Clamp	1
2	152-646	Shim	4
3	.....	Lockwasher–¾"	12
4	.....	Nut–¾"–16 N F.....	12
5	152-617	Shim	4
6	178-6601	Clamp	1
7	178-608	Frame–Counterweight	1
8	152-1897	Counterweight	8
9	.....	Capscrew–¾"–16 x 2¾" N F	12
10	152-687	Pin–For Counterweight Frame.....	2
11	.....	Cotter Pin–¼" x 3½".....	4

SHEAVE FRAME

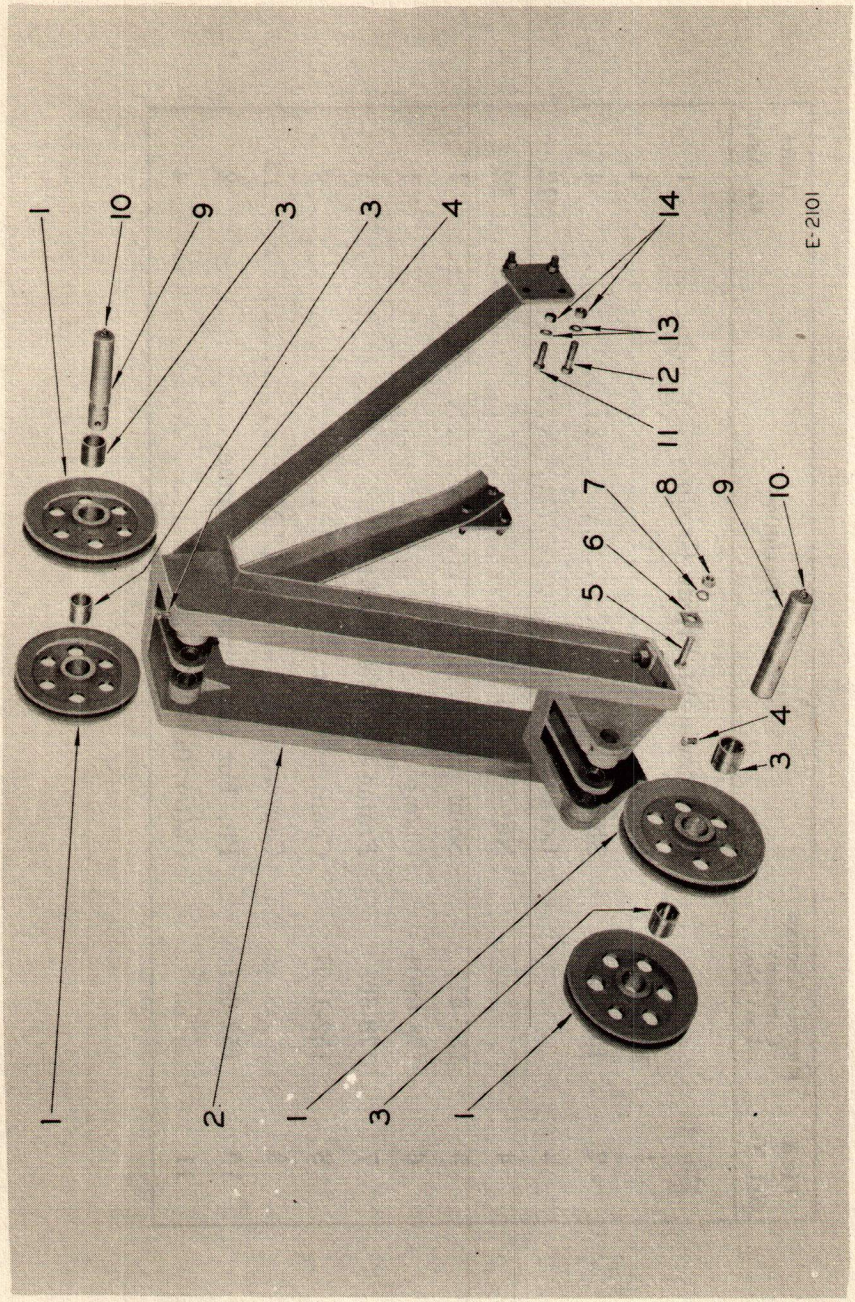

Figure 34 Sheave Frame

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 34	.....	Sheave Frame Group	1
1	151-1296	Sheave	4
2	152-607	Frame – Sheave	1
3	1-5673	Bushing–For Sheaves	4
4	.....	Setscrew–Square Head–½"–13x1" N C	2
5	.....	Capscrew–⅝"–18x2¼" N F	4
6	.....	Washer–Bevel–⅝"	4
7	.....	Lockwasher–⅝"	4
8	.....	Nut–⅝"–18 N F	4
9	152-664	Pin–For Sheaves	2
10	1-442	Fitting–Grease–No. 1610 Alemite Stewart-Warner Corp.	2
11	.....	Capscrew–¾"–16x2¼" N F	4
12	.....	Capscrew–¾"–16x2¾" N F	4
13	.....	Lockwasher–¾"	8
14	.....	Nut–¾"–16 N F	8

REAR BRACKETS

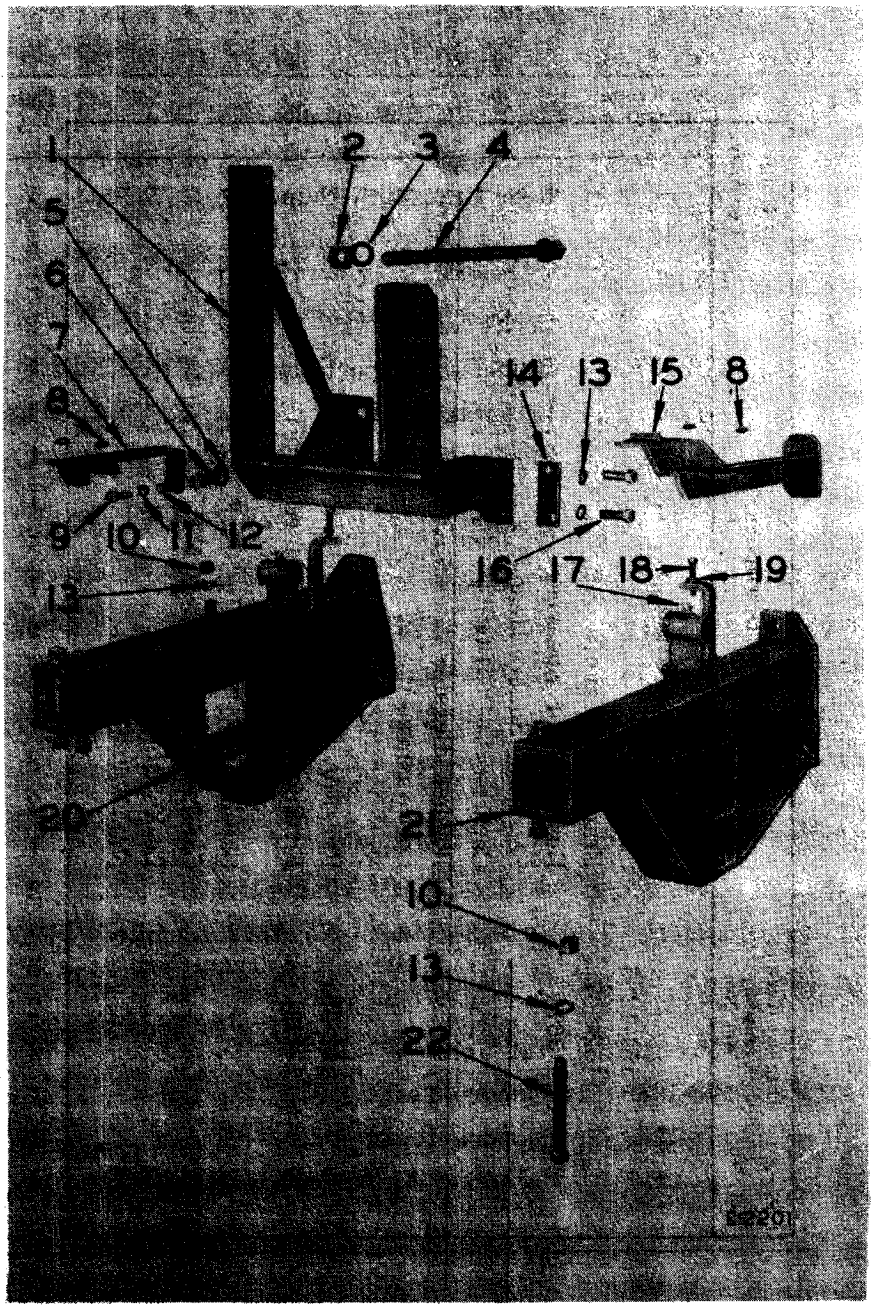

Figure 35 Rear Brackets

13462-A

REAR BRACKETS

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 35	.....	Rear Brackets Group.....	1
1	178-4730	Support–Drive Belt Idler.....	1
2	1-733	Nut–Crown–1¼"–12 N F.....	2
3	1-778	Lockwasher–1¼"	2
4	178-117	Stud-For Support.....	1
5	1-775	Lockwasher–1"	1
6	1-7003	Capscrew–1"–8x1½" N C.....	1
7	178-1267	Bracket-Support	1
8	.....	Washer–Plain–½"	4
9	.....	Capscrew–½"–13x1¾" N C.....	1
10	.....	Nut–¾"–16 N F.....	6
11	.....	Lockwasher–½"	1
12	.....	Nut–½"–13 N C.....	1
13	.....	Lockwasher–¾"	8
14	178-1243	Shim–For Idler Support.....	2
15	178-1266	Bracket–Support	1
16	.....	Capscrew–¾"–10x2¼" N C.....	2
17	1-443	Fitting–Grease–No. 1612 Alemite–Stewart-Warner Corp...	2
18	5-1121	Bolt–Adjustment	2
19	.....	Nut–Jam–½"–13 N C.....	2
20	178-1285	Support–Left	1
21	178-1284	Support–Right	1
22	.....	Capscrew–¾"–16x6" N F.....	4

BOOM LIGHT BRACKET

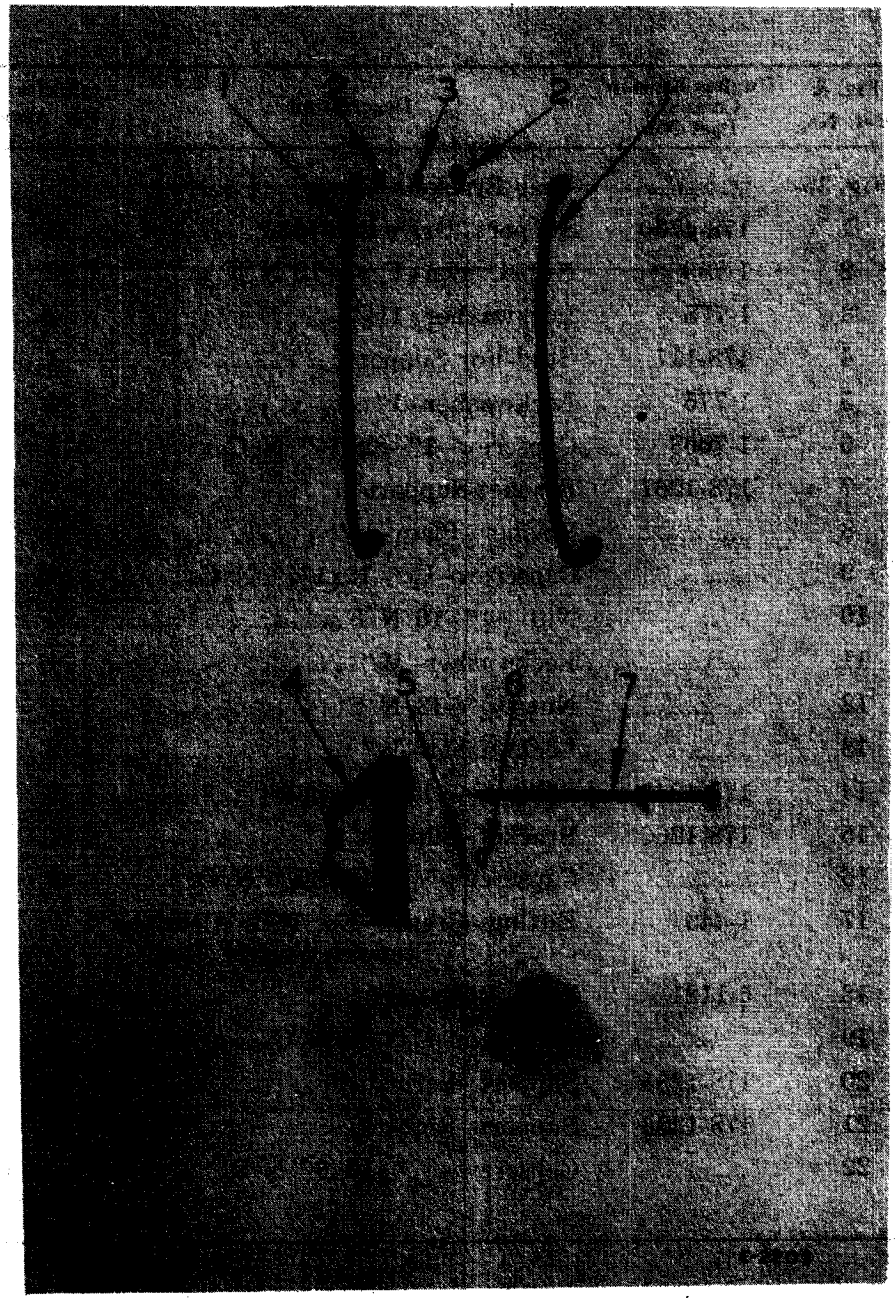

Figure 36 Boom Light Bracket

13473-A

BOOM LIGHT BRACKET

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 36	.....	Boom Light Bracket Group.....	1
1	178-610	Rail–Guard	2
2	.....	Nut–½"–13 N C.....	8
3	.....	Lockwasher–½"	4
4	178-609	Bracket–Light	1
5	.....	Cotter Pin–⅛"x1".....	4
6	.....	Bushing–Machinery–½"	4
7	178-633	Shaft–For Bracket	1

REAR SHIELDS

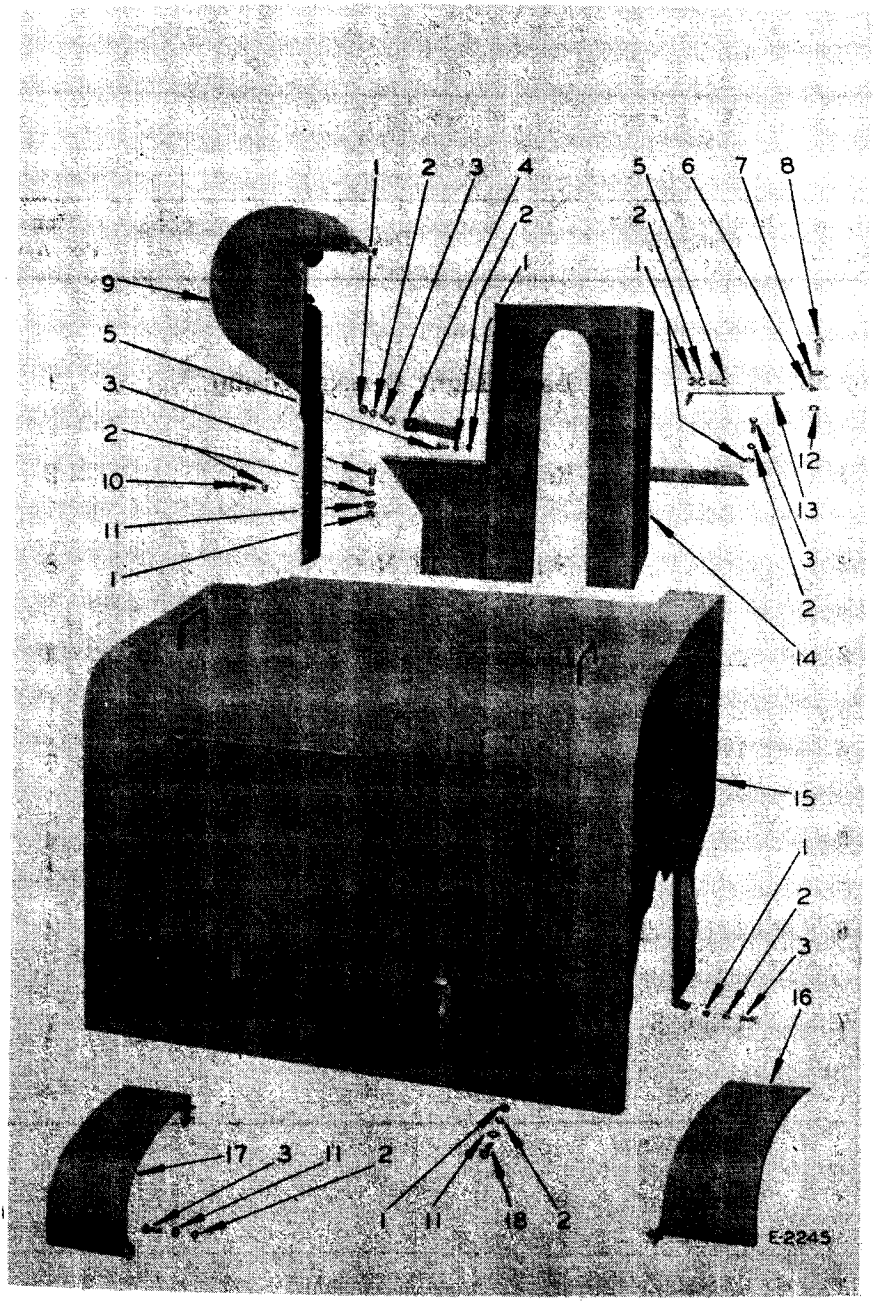

Figure 37 Rear Shields

13419-A

REAR SHIELDS

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 37	.....	Rear Shields Group.....	1
1	.....	Nut–3/8"–16 N C.....	10
2	.....	Lockwasher–3/8"	23
3	.....	Capscrew–3/8"–16x1 1/4" N C.....	11
4	178-3678	Brace	1
5	.....	Capscrew–3/8"–16x1" N C.....	2
6	.....	Lockwasher–1/2"	1
7	.....	Washer–Bevel–1/2"	1
8	.....	Capscrew–1/2"–13x2" N C.....	1
9	178-1609	Shield–Countershaft Rear.....	1
10	.....	Capscrew–3/8"–16x3/4" N C.....	7
11	.....	Washer–Plain–3/8"	5
12	.....	Nut–1/2"–13 N C.....	1
13	178-3677	Brace	1
14	178-1606	Shield–Inner Power Takeoff.....	1
15	178-1603	Shield–Rear	1
16	178-1655	Guard–Drum–Right	1
17	178-1656	Guard–Drum–Left	1
18	.....	Capscrew–3/8"–16x1 1/2" N C.....	3

REVOLVING DRIVE SHIELDS

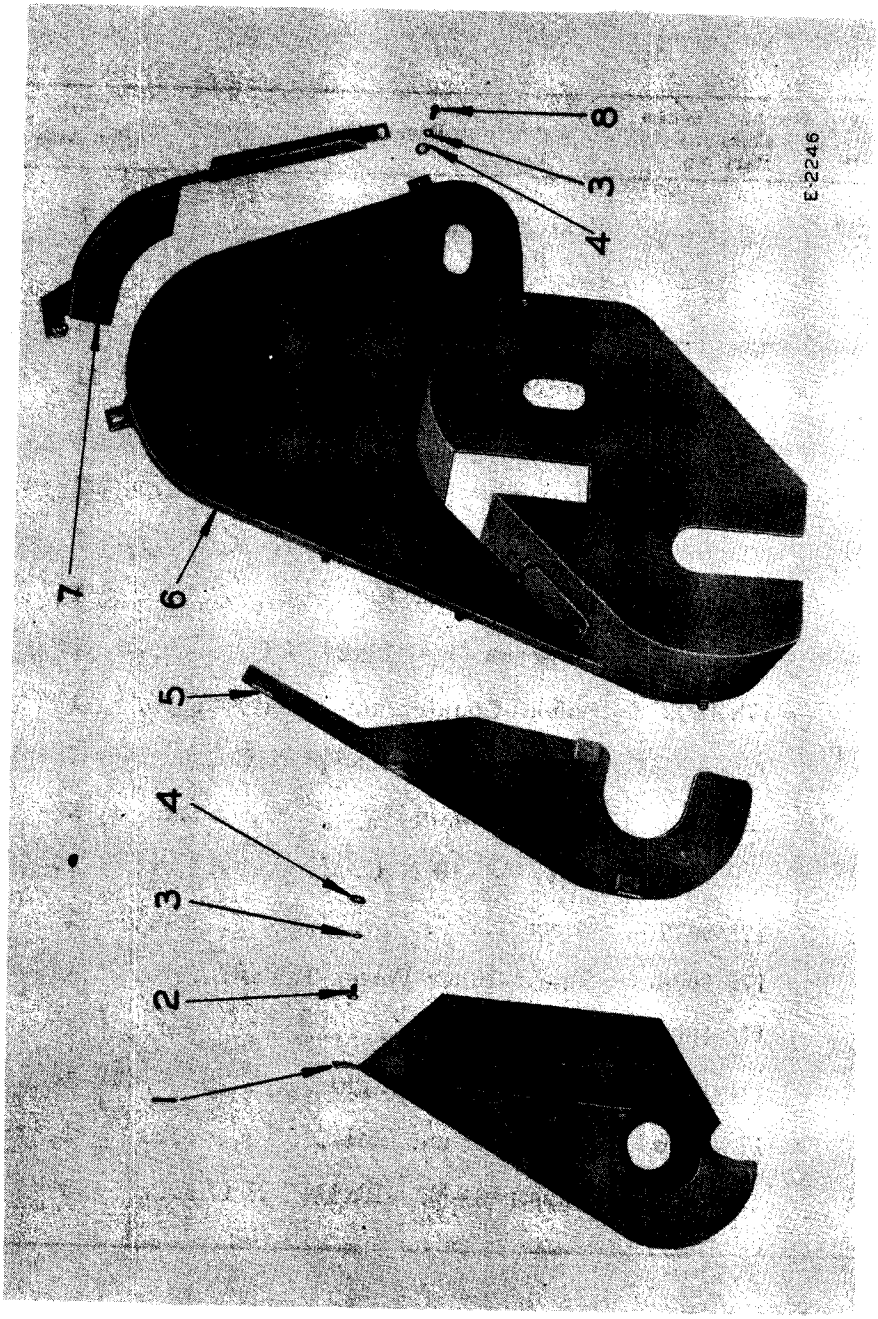

Figure 38 Revolving Drive Shields

REVOLVING DRIVE SHIELDS

Fig & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig. 38	.....	Revolving Drive Shields Group.....	1
1	178-1604	Shield–Countershaft–Front	1
2	.....	Capscrew–3/8"–16x3/4" N C.....	3
3	.....	Lockwasher–3/8"	9
4	.....	Washer–Plain–3/8"	9
5	178-1607	Shield	1
6	178-1605	Shield–Boom Drive–Rear.....	1
7	178-1601	Guard–Chain	1
8	.....	Capscrew–3/8"–16x1" N C.....	6

TOOLS

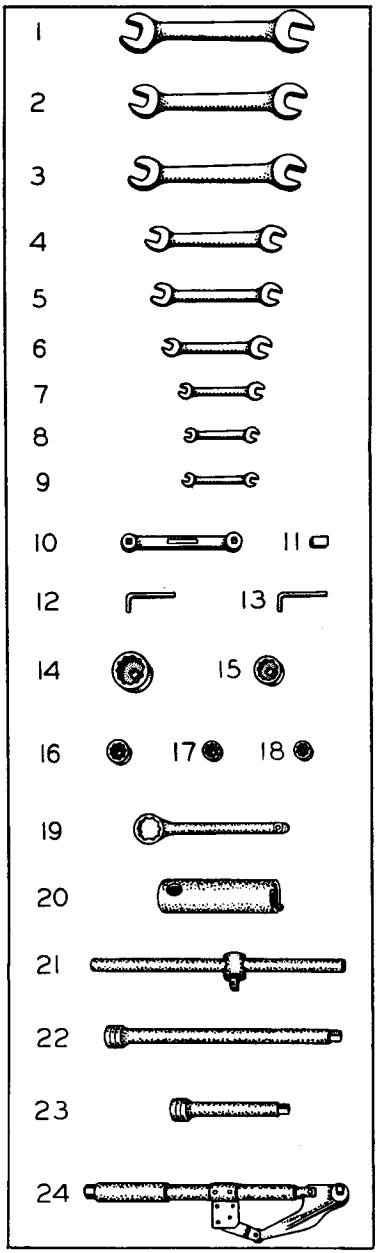

Figure 39 Tools

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig 39	.....	Tools Group.....	1
1	1-545	Wrench–End–1¼"x1 7/16" 1039–J. H. Williams & Co.....	1
2	1-546	Wrench–End–1 1/16"x1¼"– 1037–J. H. Williams & Co.....	1
3	1-5459	Wrench–End–1"x1⅛"– 1735–J. H. Williams & Co.....	1
4	1-548	Wrench–End–⅞"x15/16"– 1033A–J. H. Williams & Co...	1
5	1-549	Wrench–End–¾"x⅞"– 1731A–J. H. Williams & Co...	1
6	1-5458	Wrench–End–⅝"x¾"– 1729–J. H. Williams & Co.....	1
7	1-5457	Wrench–End–9/16"x⅝"– 1727–J. H. Williams & Co.....	1
8	1-7231	Wrench–End–½"x9/16"– 3026–Plomb Tool Co.....	1
9	1-7230	Wrench–End–7/16"x½"– 3025–Plomb Tool Co.....	1
10	1-6917	Wrench–Extension– P-40–Sunnen Products Co.....	1
11	152-4649	Wrench–Drive	1
12	1-537	Wrench–Bristo–⅜"– The Bristol Co.....	1
13	1-540	Wrench–Bristo–½"– The Bristol Co.....	1
14	1-5454	Socket–1⅞"– 60060–Blackhawk Wrench Co..	1
15	1-6174	Socket–1 7/16"– 60046–Blackhawk Wrench Co..	1
16	1-6172	Socket–1⅛"– 60036–Blackhawk Wrench Co..	1
17	1-5460	Socket–1 1/16"– 60034–Blackhawk Wrench Co..	1
18	1-5569	Socket–1"– ST-1232–J. H. Williams & Co.	1
19	1-7223	Wrench–Box–1½"– MA-48–Owatonna Tool Co....	1
20	152-1731	Wrench	1
21	1-3104	Handle–Wrench– 47153–Sherman-Klove Co.....	1
22	1-3106	Extension–Long– 47162–Sherman-Klove Co.....	1
23	1-5570	Extension–Short– S115P–J. H. Williams & Co...	1
24	1-6865	Wrench–Tension– P-50–Sunnen Products Co.....	1

INSTRUCTION PLATES

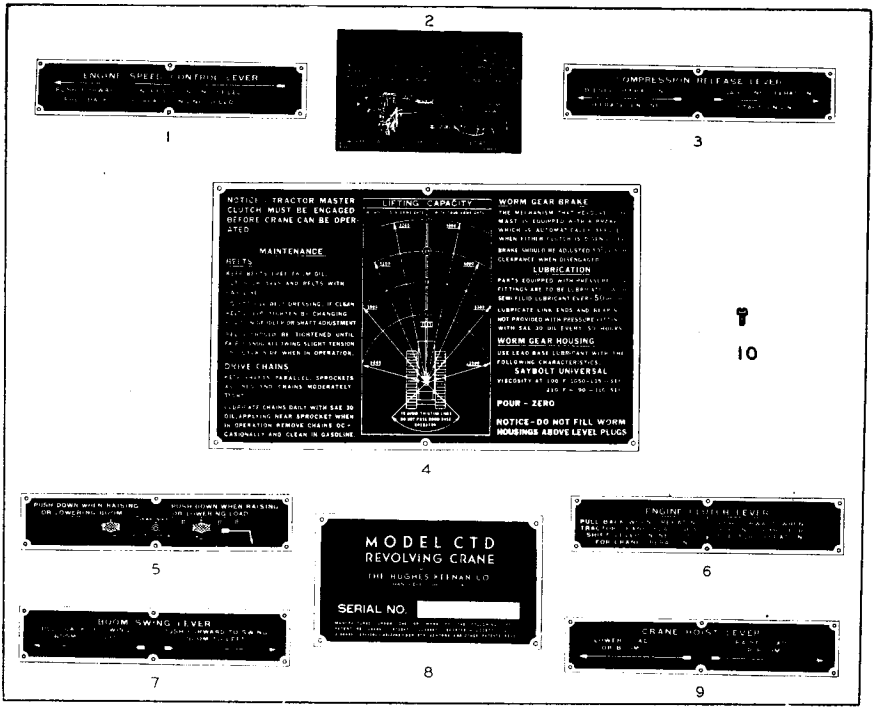

Figure 40 Instruction Plates

Fig. & Ref. No.	Hughes-Keenan Part No.	Description	Units Per Assy.
Fig. 40	.....	Instruction Plates Group.....	1
1	178-1620	Plate-Instruction- Located in front of operator, right side of Lever Mounting.....	1
2	178-4637	Plate-Instruction- Located on Inspection Opening Cover of Mast Gear Housing.....	1
3	178-1674	Plate-Instruction- Located on central portion of Main Frame, right side.....	1
4	152-3602	Plate-Instruction- Located in front of operator on upper portion of Main Frame Bolted Member	1
5	178-1679	Plate-Instruction- Located on Revolving Drive Shield below Chain Idler Sprocket.....	1
6	178-1659	Plate-Instruction- Located directly in front of operator, lower right corner of Main Frame Bolted Member.....	1
7	178-1658	Plate-Instruction- Located on Revolving Drive Shield, top of Clutch Housing.....	1
8	SW-256A	Plate-Name- Located on central portion of Main Frame, right side.....	1
9	178-1615	Plate-Instruction- Located on right arm rest of operator's seat	1
10	.....	Drive Screw-3/32"x¼"	50

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SPARE PARTS FOR ONE CRANE

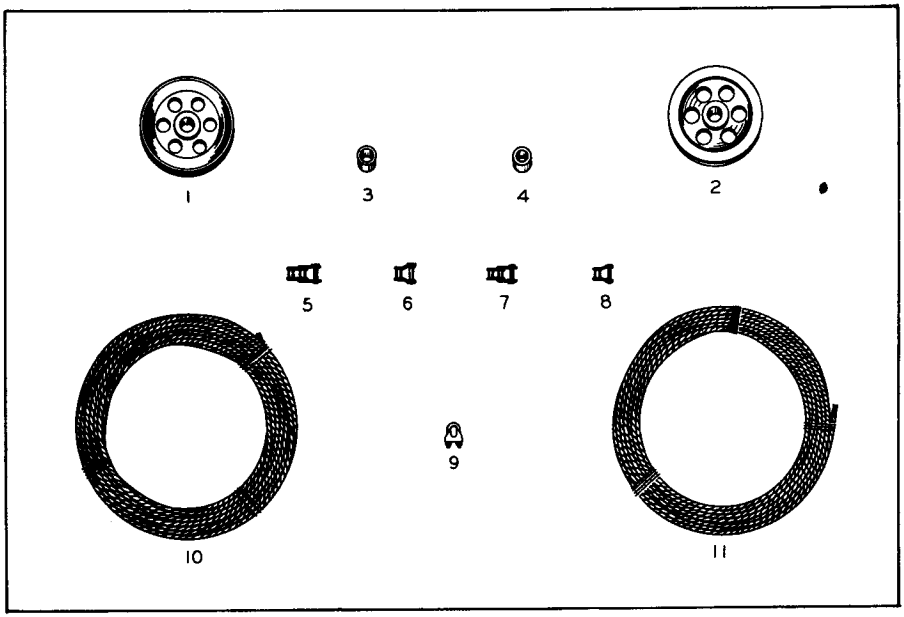

Figure 41 Spare Parts

Fig. & Ref. No.	Hughes-Keenan Company Part No.	Description	Units Per Assy.
Fig 41	.....	Spare Parts Group.....	1
1	BL-1	Sheave–10" O. D.–¾" Groove.....	1
2	151-1296	Sheave–10" O. D.–9/16" Groove.....	1
3	PLT-576-1	Bushing–1½" L. x 1¼" I. D. x 1¾" O. D.– SAE No. 64.....	1
4	1-5673	Bushing–For 151-1296 Sheave.....	1
5	1-6004	Chain–Consisting of one connecting link and one roller link– No. 433S–Diamond Chain Co.....	2 Pitches
6	1-6005	Link–Offset–No. 433S– Diamond Chain Co.....	1
7	1-5360	Chain–consisting of one connecting link and one roller link–No. 434S– Diamond Chain Co.....	2 Pitches
8	1-5361	Link–Offset–No. 434S– Diamond Chain Co.....	1
9	1-158	Clamp–Cable–½"	4
10	152-645	Line–Load–½"–190 ft. of 6x37 H. C. Preformed Improved Plow Steel Wire Rope	1
11	152-644	Line–Boom–½"–100 ft. of 6x37 H. C. Preformed Improved Plow Steel Wire Rope	1

DEPOT LIST FOR 10 CRANES

Replacement Parts for Service of One Year on 10 Cranes

Hughes-Keenan Company Part No.	Description	Quantity
1-67	Locknut— N-08—SKF Industries, Inc.	5
1-68	Lockwasher W-08—SKF Industries, Inc.	5
1-69	Locknut— N-09—SKF Industries, Inc.	5
1-70	Lockwasher— W-09—SKF Industries, Inc.	5
1-158	Clamp—½" Wire Line	12
1-442	Grease Fitting— 1610—Stewart-Warner Co.	24
1-443	Grease Fitting— 1612—Stewart-Warner Co.	24
1-455	Oil Seal— 4003—Chicago Rawhide Co.	5
1-1266	Oil Seal— 1315—Garlock Packing Co.	10
1-1525	Release—Spring— 1930-A—Twin Disc Clutch Co.	30
1-4935	Bearing— 6209RS—SKF Industries, Inc.	10
1-4989	Measuring Fitting	10
1-5222	Bearing— 1209—SKF Industries, Inc.	10
1-5238	Bearing— 6309—SKF Industries, Inc.	5
1-5239	Bearing— 6205RS—SKF Industries, Inc.	10
1-5292	Belt— C-51—Dayton Rubber Co.	12
1-5352	Locknut— N-05—SKF Industries, Inc.	10
1-5353	Lockwasher— W-05—SKF Industries, Inc.	10
1-5368	Brake-Drum— A-551—Braden Winch Co.	6
1-5369	Brake-Band— A-152-O—Braden Winch Co.	5
1-5479	Cone Assembly— C-334 Assm.—Twin Disc Clutch Co. Per T. D. Specification 18210	5
1-5486	Driving Plate Assembly— 06478BH—Twin Disc Clutch Co.	10
1-5490	Spring— 1818—Twin Disc Clutch Co.	30
1-5496	Driving Plate Assembly— 06310JH—Twin Disc Clutch Co.	10

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DEPOT LIST FOR 10 CRANES

Replacement Parts for Service of One Year on 10 Cranes

Hughes-Keenan Part No.	Description	Quantity
1-5673	Bushing	20
1-5689	Shifter Fork– ADK-143–Braden Winch Co.	10
1-5735	Safety Brake-Band Assembly– 20-652-0–Braden Winch Co.	6
1-5740	Oil Seal– 287124–Chicago Rawhide Co.	10
1-5744	Cup– 53398–Timken Roller Bearing Co.	4
1-5745	Cone– 53177–Timken Roller Bearing Co.	4
1-5757	Oil Seal– 287128–Chicago Rawhide Co.	10
1-5762	Bushing– C-133B–Braden Winch Co.	12
1-5764	Bushing– C-134B–Braden Winch Co.	10
1-5766	Thrust–Washer– M12-134A–Braden Winch Co.	10
1-5771	Sprocket-Bearing– 5208K–MRC Bearing Co.	10
1-5994	Worm Shaft– M12K6D-202–Braden Winch Co.	4
1-6161	Adjusting Yoke– A-167–Twin Disc Clutch Co.	5
1-6218	Clutch– ADK-241–Braden Winch Co.	10
1-6219	Worm-Sprocket– ADK–222–Braden Winch Co.	10
1-6637	Belt– C-120–Dayton Rubber Co.	12
151-137	Sprocket	4
151-1296	Sheave	20
152-337	Sprocket	5
152-644	Boom-Cable	10
152-645	Load-Cable	10
152A-6005	Bearing Assembly	2
178-362	Chain– 433S–Diamond Chain & Mfg. Co. 150 Pitches	5
178-1431	Chain– 434S–Diamond Chain & Mfg. Co. 145 Pitches including 1 offset link	5
BL-1	Sheave	2
BL-5	Shaft	2
PLT-576-1	Bushing	2

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NOTES

PREPARATION OF REQUISITIONS

Instructions and Sample Copy

Revisions in QMC Form 400 for requisitioning spare parts are confined to new column headings. Until new forms are available all organizations will use the present form and type or write in corrections indicated.

Under the heading "Nomenclature and Unit" list the article and the unit (ea for each; lb. for pound; etc.). Under heading "Maximum or Authorized Level" list the authorized organizational allowances or depot stock levels given in ENG 7 and ENG 8 of the ASF Engineer Supply Catalog (superseding Part III, Corps of Engineers Supply Catalog). The total number on hand for each item is listed under "On Hand". In column headed "Due In" enter the total quantity previously requisitioned but not delivered. Column headed "Required" is to be changed to read "Quantity Desired." In "Remarks" column enter additional information. For "Initial" and "Replenishment" requisitions, the sum of "Quantity Desired", "Due In", and "On Hand" should equal "Maximum or Authorized Level".

On this page is shown a sample requisition on QMC Form No. 400 which conforms to the latest revisions. The marginal notes give instructions for preparing a requisition for spare parts for Engineer equipment. Additional information on this subject is contained in Section ENG 1-2 of the ASF Engineer Supply Catalog (superseding Section AA-1 of Part III Engineer Supply Catalog), available on requisition from Engineer Field Maintenance Office, P. O. Box 1679, Columbus, Ohio.

State PERIOD designation by use of one of the following terms:
(1) "INITIAL"—first requisition of authorized allowances.
(2) "REPLENISHMENT"—subsequent requisitions to maintain authorized allowances.
(3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.

Type "SPARE PARTS" in upper right hand corner of requisition.

Give complete shipping instructions. Special instructions for packing, marking, routing, etc., should be given at the end of requisition.

State, proper nomenclature of machine, also make, model, machine serial number and U.S.A. registration number.

Prepare a separate requisition for each different machine.

State basis or authority and date delivery is required, immediately below description of machine.

Double space between items.

Group parts required under group headings as shown in manufacturers' parts catalogs (Technical Manuals).

State stock numbers, manufacturers' parts numbers and nomenclature accurately and completely. Do not use abbreviations.

WAR DEPARTMENT
Q. M. C. Form No. 400
(Revised 10 Aug. 1942)

SPARE PARTS

(SAMPLE)

REQUISITION

To: ENGINEER FIELD MAINTENANCE OFFICE P.O. Box 1679, Columbus, Ohio — No. of Sheets 1 — Sheet No. 1

Requisition No. E-531-3-45 — Date 20 February 1944 — Period Replenishment

SHIP TO Engineer Property Officer, Pine Camp, New York

MARKED FOR: Supply Officer, 149th Engineer Regiment, Pine Camp, New York

Requisitioned By (show Signature, Rank, Organization, Destination. If different from "SHIP TO" include address):
Robert E. Roe,
Major, C.E.,
Engineering Property Officer.

Approved By:
John D. Doe,
Colonel, C.E.,
Executive Officer.

MFG. NO.	NOMENCLATURE AND UNIT		AUTH. or MAX. LEVEL	ON HAND	DUE IN	QUANTITY REQUIRED	REMARKS
	PARTS FOR MODEL CTD REVOLVING CRANE, SERIAL NO. CTD-41						
	Basis: To complete First Echelon Set*						
	Delivery requested by 28 February 1944						
	REVOLVING DRIVE CHAIN IDLER						
1-5239	BEARING, Sprocket	ea	10	8	0	2	
	SWIVEL HOOK BLOCK						
PLT-576-1	BUSHING, Sheave	ea	2	1	0	1	
EL-5	SHAFT, Sheave	ea	2	1	0	1	
	BOOM COLUMN						
152-644	CABLE, Boom	ea	10	9	0	1	
152-645	CABLE, Load	ea	10	9	0	1	
NOTICE:	Standard hardware such as capscrews, nuts or lockwashers under 1 inch diameter does not have part numbers. When ordering small hardware, describe as follows:						
3/4"-16x4½	NF CAPSCREW					6	
3/4"-16	NF NUT					6	
3/4"	LOCKWASHER					6	
	*						

*Nonexpendable items such as tools must be accounted for, when requisitioned, by a statement that they have been placed on REPORT OF SURVEY or STATEMENT OF CHARGES.

Emergency requisitions sent by telephone, telegraph or radio must always be confirmed immediately with requisition marked: "Confirming (state identifying data)."

PREPARATION OF REQUISITIONS

A sample requisition in the correct form for submission by the Engineer Property Officer is shown on the opposite page.

THIS SHALL BE FOLLOWED IN MAKING OUT REQUISITIONS

In order to eliminate duplication of work, Property Officers may authorize organizations to prepare requisitions in final form, leaving requisition number space blank for completion by Property Officer.

THE FOLLOWING RULES WILL BE OBSERVED CAREFULLY IN PREPARING REQUISITIONS FOR SPARE PARTS:

a. Prepare a separate requisition for each different machine.

b. Type "SPARE PARTS" in upper right hand corner of requisition form.

c. State PERIOD designation by use of one of the following terms:
   (1) "INITIAL"—first requisition of authorized allowances.
   (2) "REPLENISHMENT"—subsequent requisitions to maintain authorized allowances.
   (3) "SPECIAL"—requisitions for necessary repairs not covered by allowances.

d. Give complete shipping instructions.

e. State proper nomenclature of machine, and make, model, serial number and registration number.

f. State basis or authority, and date delivery is required, immediately below description of machine.

g. Group parts required under group headings as shown in manufacturers' parts catalogs.

h. State manufacturers' parts numbers and nomenclature descriptions accurately and completely. Do not use abbreviations.

i. Double space between items.

j. Emergency requisitions sent by telephone, telegraph, or radio must always be confirmed immediately with requisition marked: "**Confirming** (state identifying data)."

k. Nonexpendable items must be accounted for.

IDENTIFICATION OF COMMERCIAL ITEMS AND STANDARD HARDWARE

Description or Mfg. Part No.	Sub-Contractor or Purveyor	Hughes-Keenan Part No.
BEARING		
364828 Outer Race	Bantam Bearing Corp. Braden Winch Co. No. M12K6D-104A	1-5988
1283628 Inner Race	Bantam Bearing Corp. Braden Winch Co. No. M12K6D-104B	1-5989
116S	Marlin-Rockwell Corp. Twin Disc Clutch Co. No. M281	1-5483
5411	Marlin-Rockwell Corp.	1-5237
1209	SKF Industries, Inc.	1-5222
6205RS	SKF Industries, Inc.	1-5239
6209RS	SKF Industries, Inc.	1-4935
6309	SKF Industries, Inc.	1-5238
53177 Cone	Timken Roller Bearing Co. Braden Winch Co. No. C-103A	1-5745
53398 Cup	Timken Roller Bearing Co. Braden Winch Co. No. C-203B	1-5744
BEARING LOCKNUT		
N-05	SKF Industries, Inc.	1-5352
N-08	SKF Industries, Inc.	1-67
N-09	SKF Industries, Inc.	1-69
LOCKWASHER		
W-05	SKF Industries, Inc.	1-5353
W-08	SKF Industries, Inc.	1-68
W-09	SKF Industries, Inc.	1-70
CABLE CLAMP		
½"	.....	1-158
CAPSCREW		
¼"-20x½" N C	Twin Disc Clutch Co. No. M-276	1-5492
1"-8x1½" N C	.....	1-7003
COTTER PIN		
3/32"x¾"	Twin Disc Clutch Co. No. 105	1-812
GREASE FITTING		
1610—(⅛"—Straight)	Stewart-Warner Corp.	1-442
1611—(⅛"x30°)	Stewart-Warner Corp.	1-1854
1612—(⅛"x67½°)	Stewart-Warner Corp.	1-443
1641—(¼"-28 N F)	Stewart-Warner Corp.	1-6220
1799—Measuring Fitting with 1637—(¼"-28 N F x 45°)	Stewart-Warner Corp.	1-4989

IDENTIFICATION OF COMMERCIAL ITEMS AND STANDARD HARDWARE

Description or Mfg. Part No.	Sub-Contractor or Purveyor	Hughes-Keenan Part No.
KEY—WOODRUFF		
No. 15	Braden Winch Co. No. B-118A	1-5739
No. 18	.....	1-5392
LOCKWASHER		
¼" Standard	Twin Disc Clutch Co. No. M-101	1-833
¾"—With Internal Teeth	Shakeproof Lockwasher Co.	1-5568
1" Standard	.....	1-775
1¼" Standard	.....	1-778
NUT		
⅞"-14 N F	Braden Winch Co. No. 20-558	1-5719
1¼"-12 N F	.....	1-733
OIL SEAL		
4003	Chicago Rawhide Co.	1-455
287124	Chicago Rawhide Co. Braden Winch Co. No. A-249A	1-5740
287128	Chicago Rawhide Co. Braden Winch Co. No. B-149A	1-5757
350216M-1 No. 80 Sirvene	Chicago Rawhide Co.	1-3855
375224M-1 No. 80 Sirvene	Chicago Rawhide Co.	1-479
1315	Garlock Packing Co.	1-1266
PIPE FITTINGS		
Coupling—⅛"	.....	1-220
Nipple—⅛"x2½"	.....	1-2081
Plug		
⅛" Square Head	.....	1-363
⅜" Square Head	.....	1-365
½" Square Head	.....	1-366
1¼" Magnetic	Lisle Corp.	1-1499
RIVET		
7/16" Tubular	Braden Winch Co. No. 20-553R	1-5737
9/64"x7/16" Tubular	Twin Disc Clutch Co. No. M-116	1-1522
STEEL BALL ¾"—No. 3 Grade	Atlas Ball Division SKF Industries, Inc.	1-6282

(See parts price list for description of all other standard parts)

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NOTICE

On the preceding two pages of the Parts Catalog Section appears a list of common mechanical appliances arranged according to the general classification of bearings, oil seals, grease fittings and items of standard hardware. Identifying numbers or description of common parts used by manufacturers enable the reader to determine the source of the parts.

A parts price list on the following pages is combined with an index giving the location of all parts within different parts groups. The quantity of an item used within each group and a total of the same item used on one machine is listed. The back pages of the Parts Catalog include addresses of all manufacturers who have supplied parts or equipment for the crane assembly.

ALWAYS FURNISH SERIAL NUMBER OF MACHINE WHEN ORDERING PARTS

Serial number plate is located on central portion of main frame, right side.

Separate parts within the illustrations of parts groups are identified by reference numbers. Do not use reference numbers when ordering parts. Refer to each part by the number listed under the column "Hughes-Keenan Company Part Number." Definitely state how parts are to be shipped; such as freight, express, or other means of transportation. Also, state whether parts are to be shipped "Collect" or "Prepaid." All parts prices as shown on the following price list are Net f. o. b., Mansfield, Ohio.

Claims for shortage or damage should be made immediately upon receipt of material. Responsibility for loss or damage during shipment rests with the transportation company. Demand an inspection if shipping case appears to be broken, then obtain acknowledgment of damage or loss from the agent of the transportation company.